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AN EPITOME OF THE HISTORY OF CARCINOMA.[1]

By Roswell Park, M. D., LL. D.,

Of Buffalo, New York, Professor of Surgery, University of Buffalo.

No one can scan the voluminous literature of cancer without being at first bewildered by the confusion of names and the loose and almost meaningless way in which the term and its various synonyms have been used. It is bad enough even to-day when one writer describes a growth as cylindroma and another writer rejects the term. If this be bad to-day when we have reasonably accurate notions of what constitutes cancer, how much worse must it have been centuries ago when a hundred different conditions were described under the same general term. It does not seem worth while to go back to the beginning of the Christian Era since the writers who followed Hippocrates simply represented his views, and we do not need to trace them into antiquity. Let us then begin with Celsus who wrote carcinoma in its Latin spelling and did not use the Greek karkinoma although many of his translators have done so.

In his day and long after ulcers of all kinds were confused

[1] Read before the Historical Club of the Johns Hopkins Hospital, May 11, 1903.

with tumors of all kinds, which will account for his making particular mention of venous stasis and swelling veins, and noting the fact that sometimes carcinoma causes pain and breaks down into an ulcer and at other times does not. He took this view—that if the actual cautery produces no bad effect the disease is curable, whereas if the growth is stimulated by the cautery it is a carcinoma, and active therapeutics must be discontinued. It is a curious fact that the theory of the development of cancer given by Celsus should be made the basis of an essay by Schmalz in 1825 (*Surgical Treatment and Surgical Diagnosis*).

The early writer and his late imitator distinguish some sixty or more different kinds of ulcers, among them those due to a peculiar diathesis, i. e., cancerous; and so he described ulcus cancrosum, cancer apertus, cancer genuinus, noli me tangere, open cancer, glandular cancer, etc. Celsus used frequently the term cacoethes in the substantive sense, whereas Schmalz uses it as an adjective, i. e., cancerlike. In his clinical descriptions Celsus was painstaking and often accurate. In fact he used adjectives very freely. Chironium and telephium were terms applied to an ulcer accompanied by severe pain, induration, and general formidable appearance with tendency to spread. Such terms might apply equally well to a malignant ulcer or a chancroidal bubo.

According to the Celsian view, should the suspected ulcer not improve under appropriate treatment it was certainly a cancer, but no one could make the decision without time and experiment. Writing of this Thiersch quoted the *bon mot* of Duparque to the effect that "cancer is incurable because it cannot be cured; the reason we cannot cure it is because it is incurable; therefore if one by chance should happen to cure it, it must be that there was no cancer." They had in those days also what was called thymium, a lesion of doubtful character, about which there was much uncertainty. Celsus remarks that "it is like a wart and therefore in some respects must be different, but occasionally it is found on the surface of an ulcerating cancer. Nevertheless it has an independent growth of its own."

This would look like the so-called proud flesh of the laity, as the expression, "then comes the ulcer and from it the thymium," would imply. This word, by the way, is spelled also tymium and timium. The expression seemed to the writers who used it very apt, although the younger Pliny used it in the sense of a simple swelling, and applied it indiscriminately to a boil, a pile, or a condyloma. The thymium was not very different from what was called akrochordon, which was described as a species of wart, sometimes very painful, ovoid in shape, connected to the skin by a slender stem and known as the "hanging wart." It was so called because the cutaneous surface resembled the cut end (akros) of a harp string (chordo). According to some descriptions the former would appear to be a simple horny outgrowth from the skin, and the latter a fungous papilloma; according to others, who use the expression "pessimæ," we are compelled to regard them as something more serious. In addition to the terms now strange to us, above mentioned, Celsus also used the words murmakia and clavus, which latter is still in use. Clavus in his day seems to have signified a pus producing swelling.

Celsus seems to have been conversant with the step by step process of infection, both malignant and pyogenic, but I think that we waste time in trying to determine more minutely just what he in his day meant by these terms which I have thus far rehearsed. So late as 1777 Blancardus contented himself with presenting this subject practically in the language of Celsus, adding nothing thereto, and having in his preface scarcely a word to say for himself on the subject; but the more one examines Blancardus the more evident it is that he was destitute of enterprise in medical research. There is no question that Celsus lived at a time when men had no use for the exact sciences, as even the elder Pliny acknowledged. The world was given over to excess and debauchery, and the worst form of imperialism controlled Roman thought. Medical literature of that date consisted mainly of formulæ for cosmetics, and while the baths were conducive to health and to cultivation of artistic taste, they were destructive to public morality. Some effect was produced by the alarm voiced by Plutarch and Tacitus, by the merciless satires of Juvenal and Perseus, and by the well-directed philosophy of Seneca.

In the year 131 Galen was born at Pergamos, and he finally appeared in Rome as the private surgeon and medical adviser of the young Commodus. He curiously mingled philosophy and medicine, and combined with the humoral pathology of Hippocrates a pneumodynamic theory mainly his own. To him the malignant character of cancer was well known, and he added to the views of his day concerning its internal manifestations. "In the breasts we often find a tumor in size and shape closely resembling the animal known as the crab, for as in the latter the limbs protrude from either side, so in the tumor the swollen veins radiate from its edges and give a perfect picture of the crab." Here will be seen, perhaps, the first publicly stated reason for giving to this disease this particular name. He also busied himself with its treatment and, while he considered cancer to be the product of black bile, was not opposed to operation, but gave this advice: first to get rid of the black bile by appropriate remedies and then to attempt a cure by milder applications, since "the more severe remedies merely increase the evil." He told us that there are many metallic compounds which, taken with purgatives, have a beneficial effect upon the disease in its early stages, including that if one is "minded to try the cure of cancer by surgery he must as before begin by purging the evil humor, and then immediately proceed to the removal of the diseased part so thoroughly that there shall be nothing of it left, by letting the blood flow freely and being in no haste to check it, but rather squeezing out the thick black blood from the swollen veins." Galen thus showed that he recognized that cancer possessed a malignancy peculiarly its own, for which reason he advocated the combination of medicine and surgery.

Galen operated for cancer with the knife and cauterized the wounds not alone for hemostatic purposes but for the destruction of any remaining diseased tissue. He noticed that

successful results occurred when the operation was carried out, and his language, as well as his actions, show that he was familiar with true carcinoma, although he was not aware of the function of the lymphatics. He nevertheless was earnest in calling attention to what he knew of metastasis, even through the venous circulation. Evidently with him, also, it was not only the amount of the humor but its character which determined the subsequent growth, but he says it is the thinnest of these humors which gives rise to the herpetic ulcer while the thicker causes cancer. Galen's general pathology was a sort of organic theory of disease. He maintained—in opposition of Archigenes—that it is always by reason of disordered function that a part becomes diseased, and that an organ can only become directly diseased as a result of transmission from other diseased foci. Hence we can readily understand his object in always preceding an operation for cancer by a system of general treatment. If, therefore, he became enthusiastic in his praise of phlebotomy, or in his use of purgatives, we must give him credit at least for some sort of rational basis for his therapeutics.

Following the death of Galen medicine entered upon a period of quiescence if not somnolence. Leonidas of Alexandria, some 200 years after Christ, wrote as follows, if we may trust Aetius: "If, therefore, the breast be entirely involved in the scirrhotic growth so that the surrounding part is endangered should an amputation be attempted, under no circumstances should we operate. If, however, the apex or only one-half of the breast be included in the growth the breast should be removed, and the wound cauterized." When he feared hemorrhage he often operated in two sessions, for he says: "I then cut a second time and dissect out the whole breast and afterwards cauterize the wound, often repeating the cautery." The first cautery was for hemostasis, the second for the extirpation of infected tissue.

For several centuries nothing of interest transpired until we come to the writings of Alexander of Tralles, who excelled rather in treatment than in diagnosis. In his ninth book he discusses cancer and offers several methods of treating it from a humoral point of view. Among other things he highly praises the treatment of cancer of the liver by the use of chalybeate waters.

The work of Paul of Aegina is mainly a compilation, in the fourth book of which he treats of external diseases, among them cancerous tumors, for the treatment of which he repeats Galen's precepts, particularly the advice that all operations are to be preceded by a free purgation of the black bile. After Paul came little of any value. Nonus and Mercurius in the tenth century were absolute compilers, and Myrepsos, another of the same class, was dubbed by his contemporaries "the perfumer," polypharmacy being his strong point. His book on medicine is an alphabetical breviary, divided into 48 chapters, containing some 300 senseless prescriptions with pathetic appeals to God and Christ. His treatment of cancer is included under the head of "aromatics and specifics for the cure of lice and spots on the skin."

The Arabs were too firmly bound by the authority of Galen to make any advance. They added still more to the polypharmacy of their day, and not until the time of their later scholars was anything of value said regarding cancer. Avenzoar, however, who was really of Hebrew origin, showed a rather remarkable knowledge of pathology, as is illustrated in his discussion of cancer of the stomach. Some of their writers advised early extirpation of cancer and of all infected tissue. Albukasim remarks: "When cancer has become old and large you should have nothing to do with it. I have never been able to cure one, nor have I ever seen any one who has."

The notions of the Arabians were reflected in the Latin writings of the Middle Ages. William of Salicet says: "Cancer is a tedious disease—the more you interfere with it the worse it becomes." He frequently termed it *noli me tangere*. Lanfranchi says: "The general rule with cancer is that it can only be cured when it can be entirely removed, along with its roots." He had noticed the occurrence of cancer in badly healed wounds and advised their partial cauterization for the purpose of diagnosis. If the growth increased it was an original cancer. Guy de Chauliac endeavored to recognize the cause of cancer; his conclusion was: "Ulcerating cancer is caused by the existence of a former non-ulcerating cancer, or the irritation of chronic ulcers." He also held that if it be in a locality where it can be entirely removed it should be operated; if not, no attempt should be made save at palliation. He advised caustics for causing the death of suspicious tissue, and considered arsenious acid as desirable for this purpose. If the diseased tissue was thus completely destroyed the fact was shown later by the advent of a scar, and healthy appearance of the adjoining flesh.

But in time all operations fell into disrepute and cancer came to be regarded as practically incurable. The theorists of the Middle Ages with their immutable dogmas and superstitious reverence for Galen obstructed progress in every direction. Cancer was as before "an ulcer of horrid appearance, evil smelling, and presenting a hard, thick, discharging, everted border."

It was centuries before men could break away from the use of the red-hot knife. The celebrated Fabricius, he of Aquapendente, advised that glands be seized by forceps and cut away with a red-hot knife, or that an incision be made about the breast with a wooden or horn knife previously dipped in aqua fortis, and the glandular substance subsequently removed by the means of the finger and nails. But let us give the credit due to Fabricius for the suggestion to feed by a tube introduced through the nose into the stomach in cases of œsophageal contraction.

Paré, great man as he was, did not make the advance in this direction which might have been expected of him. He did not even do as well as did Fabricius Hildanus, who achieved the title of a noted operator because he operated with the knife, ligated the vessels, and dissected with his fingers. He also cleaned out the axilla in breast cases and conducted many cases to recovery. Paré was in most respects a follower of Galen. Dyscrasia was the ghost that haunted

medical literature for centuries, and is not even yet quite forgotten. "Cancer is from black bile, said Galen;" . . . "cancer is the product of melancholie," falls like an echo from the lips of Paré, who described under the head of melancholic tumors true scirrhus, and other cancerous tumors corresponding to the cacoethes of Galen.

Paré distinguished four kinds of tumors due to black bile:

1. The hard scirrhus proper, which is accompanied by no pain, is not sensitive on pressure, and is caused by natural black bile.

2. The imperfect, rough, painless, stone-like scirrhus, which is caused by great chilling or disintegration of humors.

3. The cancerous scirrhus caused by the heating and corrupting of humors.

4. The scirrhus phlegmonides, which is caused by the mixing of the bile and the blood.

Paré's treatment for these various conditions included abstinence in all respects, the classic method of black bile purgation and the external use of counter-irritants, fumigations, mercurial plasters, goat dung, and many other more savory applications, beyond which ingenuity could scarcely go. Paré described the transition of cancer occultus into cancer apertus, i. e., non-ulcerating into ulcerating forms as clearly as any clinician could desire. The pain, irregularity of shape, tendency to hemorrhage, oozing discharge, infiltration, etc., he faithfully portrayed. On one of his pages he gave a picture of a large sea crab and says: "Also the cancer is brownish blue in color, and uncouth in shape, like the animal whose picture is appended." He realized that women are more subject to cancer than men, called attention to the frequency of infiltration and metastasis, did not decry operation, but reminded his readers of the 38th aphorism of Hippocrates, which counsels against operating upon deep-seated occult cancers or those of long standing, or those occurring in patients of feeble constitution. He advised the use of sweet milk to destroy the odor of cancerous discharge.

His operative methods comprised two distinct procedures, the excision of the tumor with a broad margin of healthy tissue, with compression of the neighboring vessels and vigorous use of the hot iron, or the elevation of the tumor by means of a thread passed through it, its extirpation by means of scissors, and lateral incisions when necessary for relief of tension.

Throughout the seventeenth century black bile continued to be regarded as the chief cause of cancer. Frere Côme set a good example to posterity when, after having purchased a secret nostrum, he made public its ingredients, which were about as follows:

Cinnabar, 2 parts.

Ashes of old burnt shoes, 3 parts.

Dragon's blood and white arsenic, each 12 parts.

This was applied in dry powder or in paste mixed with oil.

One of the earliest real departures made from the old tenets was that of Ledran, who in 1757 published a work in which he showed the purely local character of cancer in its beginning and then formulated the best methods of cauterization. He devoted considerable space to the discussion of tumors of the breast, of which many are curable, and expressed the opinion "that not all is cancer which has been taken for such." Soon after this came Louis' publication on fungous growths of the dura and diseases of the eyeball, including cancer of the eye. Still confusion of terms complicated every thing, and in Plenck's essay on skin diseases, published in 1776, he describes 18 sorts of tumors, including inflammatory tumors, pus tumors, gangrenous tumors, hard tumors, water tumors, blood tumors, etc. This reminds me very much of a hospital that I visited in Seville a few years ago, where one ward was reserved for "Dolores," all patients who were suffering from pain being sent there.

Richter describes two classes of tumors, inflammatory and non-inflammatory, placing cancer among the latter. His remarks are quite in accord with those of von Swieten, who describes them as bad smelling, easily bleeding, rodent, ulcerating growths, which are found on the lips, tongue and genitals. Scirrhus they described as a hard, painful tumor situated in an organ rich in glands and having a tendency to cancerous growths, and then admits that these growths may arise from cracks, excoriations, styes, etc. Even Richter could not get away from the old black bile, but he held that it could not arise from inflammation alone. He regarded dyscrasiæ as predisposing elements in causation of cancer. Along with his colleague, Schmucker, he denounced bitterly the use of corsets as the invention of "that accursed Pompadour."

While Hunter's contemporaries were playing with belladonna and rabbit skins and all sorts of quackery, Hunter himself was experimenting with the control of fixed tumors by means of compression, but by fixed tumors he meant inflammatory lesions, whose nourishment he was trying to reduce by pressure. Fischer and Desault were trying to accomplish the same thing in the case of rectal cancer by the use of rectal bougies. The writings of Munro threw operative treatment into such disrepute that the Amsterdam Guild of Physicians felt called upon to offer a prize of 100 ducats for a safe and practical method of curing cancer. As may be imagined numerous remedies were proposed, and now came into repute the wonderful properties of cicuta (water hemlock or cowbane) which ran about the same course in those days that cundurango did in ours. As a result of disappointment with all these remedies operative methods came back again into vogue. Cancer of the breast, lip and scrotum were generally operated upon. Finally Petit gave formal expression to insistence upon the necessity for the removal of swollen glands of the axilla in cases of cancer of the breast.

And next comes the French Revolution, which not only shook the nation to its very foundations, but was a new era in that the authority of the ancients was no longer revered. A cold materialism sought to derive everything from the inherent properties of matter. Mysteries were no longer tolerated. The doctors of Paris even went down to the halls of death and sought to find the seat and secret of life among the still bleeding heads of those who had been guillotined. It was in 1773 that Peyrilhe declared that to cure cancer, even

to define it, was extremely difficult, which bit of wisdom won for him the Dijon prize. Morgagni died in 1771; just thirty years later Bichat gave the final touches to his great work on Anatomy. During the winter of 1801 he himself made six hundred autopsies in the Hotel Dieu. Of this work Corvisart wrote to Napoleon that no one in so short a time had done so many things and done them so well. He was the first to distinguish between stroma and parenchyma in tumor tissues, although he ascribed a fallacious importance to connective tissue.

Bichat's spirit survived, although he died a most untimely death, for Laennec made a sharp distinction between carcinoma together with tubercle and melanotic and other growths, basing this upon their histological structure. Some of the writers of that day saw that about these cases which they regarded as infection, and have endeavored to trace its path in the blood vessels and thoracic duct.

In the same way we owe to Laennec our insight into the relation of cancer to the internal organs. He also pointed out that scirrhus is not merely a hard tumor, and a forerunner of cancer, but of itself a distinct form of connective tissue cancer, which he classed along with the encephaloid, melanoma and tubercle, among heterologous growths.

It was, perhaps, Lobstein who first divided tumors into the homologous and heterologous or heteroplastic. He held that the latter forms arise from some form of lymph that has been introduced into an organ from an outside source. This lymph was compared by Lobstein to Hunter's wound and infiltration lymph agrees entirely with the blastema and exudate of Rokitansky and even later authors, and is either benign or malign, the latter giving rise to cancer. By the efforts of the school to which Lobstein belonged, including such men as Andral and Cruveilhier, Billiard and Velpeau, the differential diagnosis of tumors of the breast was greatly advanced, while such men as Astley Cooper in England, and Walther in Germany, were quite won over to these views.

After this the French rather retired from their advanced position, and their place came to be more occupied by German investigators. Stieglitz, writing in 1840, made this sad confession concerning his German colleagues: "German medicine is so far degraded and spiritless that any stimulus whatsoever that pushes it forward in a new road is sure to be of benefit, even though the path be beset with errors and perversities." Soon after this, however, all Germany began to move forward and scores of names are inscribed in imperishable characters in its history of medicine for the past half century. The theory of cancer profited by this forward motion and soon appeared in new dress. In the beginning of the third decade microscopical diagnosis was still a *pium desiderium*. Johannes Müller, after years of work, described six kinds of operable tumors, and seven kinds of carcinoma, which could not be cured by extirpation. Our knowledge was materially advanced by the researches of Schleiden and Schwann into animal and vegetable cells, by which many other things were to be reconciled. The allusions of Müller, in his third edition, 1838, to the more delicate structures of pathological growths called forth numerous contributions of a similar character from other writers. Moreover, he held that cancer formations do not arise from primitive tissue by degeneration but are produced by new cell formation, deposited as a specific element of disease in the normal connective tissue of the organ. He found also in this statement an explanation for the general infection certain later to pervade the whole system. Translated into the thought of to-day the most advanced of us would scarcely go beyond a similar doctrine. Müller is believed to have been the first to demonstrate the presence of nucleated epithelium in cancer. Naturally, with such views, Müller discarded all distinction between homologous and heterologous growths. This was taken up by Henle in 1839 and by Vogel in 1842, and an effort was made to prove that each growth is really a variation from normal growth due to defective or to active individual mother cells. About this time also began the attempt to discover specific cancer cells with the microscope, whose significance would be of greatest importance in diagnosis. This effort was carried altogether too far, since some enthusiasts denied the accuracy of all diagnoses where such cells were not found.

In 1847 great mischief was wrought by the introduction of the term cancroid by Bennett. This was to be the term by which all growths were to be known where the specific cancer cell could not be found. Then Virchow and Forster, as well as Lebert in 1850, limited the term cancroid to diseased tissue which presented alveoli with epithelial collections. Therewith epithelial cancer became the cancer par excellence, and many tumors took the name of sarcoma which hitherto were considered carcinoma. In 1852 Hanover introduced the term epithelioma, and Robin and Bidder described cylinder-epithelium cancer. By this time confusion in terminology was almost complete, and now for several years the epithelial cell, in epithelial cancer, was regarded as arising independently of pre-existing epithelium from connected tissue corpuscles. It was apparently von Bruns who, in 1847, first emphasized the rôle of the lymphatics in spreading this disease. Even in 1856 the condition was still regarded as uncertain and was the cause of many controversies.

J. Müller had already reported upon the spores given off by the body humors in cases of carcinoma, and it had been frequently noticed that in cases of melanotic cancer these were heavily charged with pigment. It was not long now before pathologists were divided as between those who held that primary cancer becomes constitutional by a general infection through the blood vessels, by means of a blastema or virus of some sort (theory of infection) and those who regarded the constitutional effects as due to the transmission of epithelial constituents and debris (theory of transplantation). Others yet saw in primary carcinoma only a local expression of a general carcinosis already acquired. The rest of the history of cancer is certainly well known to you and it is scarcely necessary to attempt to bring it down beyond the pioneer experiments of Waldeyer and Volkmann's early researches. It was through these studies that some sort of order

was finally restored, and that ideas which presented an indescribable jumble were more or less simplified.

Here I think I may venture to leave the subject as being rather too recent to justify discussion before a club devoted to the history of medicine, since the rest of it is almost within the personal recollection of those who may hear or read this paper.

The old claim of Peyrilhe that to cure cancer, even to define it, is most difficult, has been proven amply true. Even so rough an epitome of the history of the subject as these few pages afford will amply substantiate the statement that I have often made—that the problem of cancer stands before us still as the pathological mystery of the ages.

Because of its importance, as well as because history of the past makes progress easier in the future, I have ventured again to discuss the general subject of cancer in this city, and at this time.

GOVERNOR JOHN WINTHROP, JR., OF CONNECTICUT, AS A PHYSICIAN.*

By Walter R. Steiner, A. M., M. D.,

Formerly House Medical Officer, The Johns Hopkins Hospital

The character of John Winthrop, Jr., is one of the most fascinating in the colonial history of New England. His "qualities of human excellence were mingled in such happy proportions that, while he always wore the air of contentment, no enterprise in which he engaged seemed too lofty for his powers. Even as a child he had been the pride of his father's house; he had received the best instruction which Cambridge and Dublin could afford, and had perfected his education by visiting, in part at least, in the public service, not Holland and France only in the days of Prince Maurice and Richelieu, but Venice and Constantinople. From boyhood his manners had been spotless, and the purity of his soul added lustre and beauty to the gifts of nature and industry; as he travelled through Europe he sought the society of men eminent for learning. Returning to England in the bloom of life, with the fairest promise of preferment, he preferred to follow his father to the New World, regarding 'diversities of countries but as so many inns,' alike conducting 'to the journey's end.'"

"The New World was full of his praises; Puritans and Quakers and the freemen of Rhode Island were alike his eulogists; the Dutch at New York had confidence in his integrity. In history he appears by unanimous consent, from early life, without a blemish; and it is the beautiful testimony of his own father that 'God gave him favor in the eyes of all with whom he had to do.'"[1]

But it is not only Bancroft who thus eulogizes him. The historians of Connecticut, Trumbull, Hollister and Johnston, also sound his praises. Trumbull calls him "one of the most distinguished characters in New England," and says "he rendered many important services to the colony, was exceedingly beloved in life, and died greatly and universally lamented."[2]

Winthrop followed his father to this country in 1631 and was shortly thereafter made an assistant in the Massachusetts Colony.[3] A year later he led a company of twelve to Agawam (now Ipswich), where a settlement was made.[4] In about a year he returned to England and received a commission to be Governor of the River Connecticut for one year.[5] On coming back to America he built a fort at Saybrook, Connecticut, and resided there part of that time.[6] Then, making no effort to have the commission renewed, he returned to Ipswich and became one of the prudential men of the town. Subsequently he moved to Salem, established some salt works there, made another trip to England, and finally, receiving Fisher's Island as a grant from the General Court of Massachusetts,[7] went there in the fall of 1646. In the spring of the following year he removed to Pequot (now New London), but, after a residence of eight years, moved to New Haven. From here he was called to dwell in Hartford on being elected Governor of Connecticut in 1657. He had previously (September 9, 1647) been given a commission to execute justice in his town (Pequot) "according to our laws and the rule of righteousness," and in May, 1651, was elected an Assistant of Connecticut. He served as Governor one year, then became Deputy Governor on account of a law which prevented his re-election. This law being repealed the next year, he served continuously as Governor from 1659 till his death in 1676, although in 1667,[8] 1670[9] and 1675[10] he requested to be relieved of this office.

From his youth he was devoted to scientific studies and was an omnivorous reader of books. Alchemy greatly interested him and among his correspondents were numbered Dr.

* Read in part before the Johns Hopkins Hospital Historical Club, May 11, 1903.

[1] Bancroft, Hist. of the U. S., Boston, 1879, i, pp. 420-421.

[2] Trumbull, Hist. of Conn., New London, Edition of 1898, i, p. 390.

[3] Winthrop, Hist. of New England, Boston, Edition of 1853, p. 76.

[4] Winthrop, op. cit., p. 100.

[5] Winthrop, op. cit., p. 170.

[6] Water's Sketch of John Winthrop, The Younger, 1900, pp. 17-18. This work has been largely used in the following account of Winthrop's life.

[7] This grant was subsequently confirmed by both Connecticut and New York.

[8] V Mass. Hist. Coll., viii, p. 120.

[9] V Mass. Hist. Coll., viii, p. 137.

[10] V Mass. Hist. Coll., viii, pp. 169-170.

Robert Child, Sir Kenelm Digby, George Storkey and Jonathan Brewster, all of whom had like ties. He was also much attached to astronomy and with his telescope, which was "but a tube of 3 foote & a half with a concave ey-glasse," he was able to see five satellites of Jupiter and make other celestial observations.[11] He seemed to enjoy especially the association with scientific men. In 1661, when he went to England for a third time, he arrived not long after the Royal Society for Improving Useful Knowledge was organized.[12] On December 11 of that year he was proposed for membership by William Brereton, afterwards Lord Brereton, and was admitted January 1, 1662.[13] During his stay in England, which continued till the early summer of 1663, he took an active part in the society's proceedings, read a number of papers on a great variety of subjects, and exhibited many curious things.[14]

John Winthrop

He came naturally by his liking for medicine, as his father had no mean knowledge of this science. In a letter his father wrote, on the occasion of his son's illness at Ipswich, he speaks of drugs and remedies which show him to be well acquainted with them.[15] This bent toward medicine existed in other members of the family also, for we learn Winthrop's brother Henry's widow "was much imployed in her surgurye and hath very good successe,"[16] and his son Wait and grandson John had both a laudable knowledge of medicine for their times.

At this period in the medical history of New England the offices of clergyman and physician were frequently associated in one individual—instances of what Cotton Mather has called "the Angelical Conjunction,"[17] the cure of body combined with the cure of soul. This association may largely have been due to the survival of the custom of the dark ages when the priests were considered the repositories of learning and held both of these offices. There is, however, an additional reason in the fact that medicine alone was not very profitable at this time, so we find some turning also to divinity, as Giles Firmin, who "previously did make and read upon the one Anatomy in the countrey very well."[18] In a letter still preserved he says: "I am strongly sett upon to studye divinitie: my studies else must be lost, for physick is but a meene help."[19]

"The scarcity of physicians in the Colonies and Winthrop's willingness to give advice free of charge—so far as his studies enabled him to do so—caused him to be much consulted."[20] Connecticut, Massachusetts and Rhode Island were the territories in which his patients mostly lived. They were frequently sent to him, generally at Pequot or Hartford, but at times he would come to see them in consultation with the village doctor, or otherwise, when they were too sick to be moved. Some were also treated by him by letter, without personal inspection. Cotton Mather says: "Wherever he came, still the Diseased flocked about him, as if the Healing Angel of Bethesda had appeared in the place."[21]

From his published papers, which consist mostly of letters addressed to him, I have been able to glean something relating to his career as a physician. In all I have collected over one hundred medical references.

His first patient appears to have been his father, who in some way had injured his finger. On April 11, 1628, Winthrop writes his father that he is sending some yellow and black plasters which were given him by a woman "that is very skilfull and much sought unto for

[11] V Mass. Hist. Coll., viii, p. 93. He was distrustful of having seen five satellites as Galileo and others had only observed four.

[12] It was first organized in 1660 but was not incorporated until two years later. Birch, Hist. of the Royal Soc., p. 67.

[13] Birch, op. cit., p. 68.

[14] Some of his papers during this period were on strange tides, the refining of gold, the making of pitch, tar and potashes, the building of ships in North America, and the brewing of beer from maize bread. Among the things he exhibited were a self-feeding lamp, of his own invention, malleable mineral lead, piece of a rock of granite, bluish grains of corn grown on the West Indies, and the tail of a rattlesnake.

[15] R. C. Winthrop, Life and Letters of John Winthrop, Boston, 1867, ii, pp. 265-266. In 1634, Dr. Stafford of London sent over an interesting collection of recipes, probably for John Winthrop, although they may have been intended for John, Jr. (See Holmes, Mass. Hist. Soc. Proc., 1862, pp. 379-399). The venerable Cotton (Magnalia, Hartford, edition of 1853, i, p. 131) says that the elder Winthrop had been a "Help for our Bodies by Physick, for our Estates by Law."

[16] R. C. Winthrop, op. cit., ii, p. 76.

[17] Mather, Magnalia, Hartford, edition of 1853, i, p. 493.

[18] III Mass. Hist. Coll., iv, p. 57.

[19] Hutchinson, Coll. of Papers, Boston, 1769, p. 169.

[20] Waters, op. cit., p. 47.

[21] Mather, op. cit., p. 159.

these things." Directions for their use accompany them.[22] At the end of four days his father says: "I prayse God my finger is well amended, my surgeon did his parte well, and stayde the gangrene and tooke out the mortified fleshe, but because your love and peines should not be lost I have betaken myselfe wholly to your plaister wch the Surgeon likes well enough; & I prayse God it goeth well forward."[23] Some years later, in 1637, Winthrop's wife seems to have swallowed some pins. We do not know what means were employed to relieve her, but his father writes him a letter expressing great gratification that the wife had been delivered from so great a danger. He adds: "I hope it will teach my daughter and other women to take heed of putting pins in the mouth, which was never seasonable to be fed with such morsels."[24]

Besides these references we find many others which show the esteem in which his family held him for his medical knowledge. Winthrop's father-in-law, Hugh Peters, writes from Salem, saying: "My head is not well, nor any part at present, for I cannot get sleepe. I would you should send mee word what you will doe therein but rather come over" (from Ipswich).[25] He later speaks of his old malady of the "spleene" and says: "I never had hart or tyme to attend any cure, that I now give my life gone: & shall not live my parts I feare."[26] How little did he then know of the truth he was telling, for in eleven years he was executed as a regicide, at Charing Cross, on October 16, 1660! Winthrop's brother-in-law, Samuel Symonds, was a prominent man in Ipswich, and finally became Deputy Governor. In 1647 he states that his wife's indigestion is better and adds: "Good wine (as you say) is the best cordiall for her."[27] In a later letter he mentions his daughter having received some physick from Winthrop and being benefited by it.[28]

Eight years prior to this last communication, in 1641, Winthrop's aunt, Lucy Downing, from London, tells him she has "experimented the crocus this 2 nights, and found much though not a totall fredom of payne thereby."[29] Other letters follow this one about her various ailments. One written January 17, 1661, possesses some interest and causes us to wonder what she really had. She says: "I was taken with a veri sore paine one my leaft side wich at betwickst my short ribs and my buckell boone: and the paine being so sharpe, it was feared to have bene plurisi, but wen the dockter came he said it was not a plurisi but he judge it to be the stonne in the kidney, and thereupon did apli mani thing both inward and outward to remove the paine; the extremiti there of did put me into a very feaverish condishion, and to or thre fits of a fever, and then i was pritti well recovered; but retern by a little could, but I relapsed in to another of those fits, and then i tried hot brikes to my side, and bages of fried oats, and up on the use of them i found the paine did much mittigate, and then i sent to the dockter, and he sent me a plaister wich I found, the same night i laide it on, it did much dispers the paine all aboute my bodi, and the neckst morning i found my seulf much better than formerli, and both my stomak and by weast are much better then of aweake before, but am still verri tender, and forst to kepe my chamber; but I have veri good hopes that the plaister may be a means to prevent such extremity for the futurr, and the dockter now thinkes it was some other trouble and not the stone." She forbare sending for Winthrop as she got some ease and hopes of recovery.[30]

Two years before Winthrop's death she was still living, although well on in years. She then mentions her increasing deafness, states that she had consulted two doctors for it and that they both agreed "the more she did tamper with her ears the worse it might be for her." She is "not willing consequently to a further hazerd of her ears and her mony allso for nothing."[31] On another occasion she speaks of her son, George Downing, "who tooke cold by water, his urine was wholly obstructed for 60 houres, wch put him into soe highe fever, that his Doctours did all despaire of his life. His Majesty sent him two of his Doctors; at last they all agreed to put him into a bath, wch it pleasing God to blesse, by degrees, it did give him some ease."[32]

Winthrop's niece, Hannah Gallup, writes to him on two occasions. At one time she wishes a litle phisicke and some directions for a "disease much like the fluxe."[33] In the other letter he is thanked for the "physik and other kindnesses."[34] Stephen and Samuel, Winthrop's brothers, also occasionally write to him about matters medical. The former, who served in Cromwell's army and Parliament, informs Winthrop, August 2, 1653, that he has been "this two years extreamly troubled wth the Zeatica, & am just now goeing to the Bath to see if yt may remedy it. My much lying in ye wet feilds uppon the ground hath brought it uppon me, as it hath uppon many others."[35]

Wait, Winthrop's younger son, frequently writes to him on medical topics and often he gets his advice as to treatment. In 1671, he wishes some directions for "convultion fitts in children, they being often troubled with them here (Boston); also for Mrs. Mary Maning for her old distemper, which you have given her something for formerly. She has bin very bad a prety while, voyding much blood, and the fundament falling downe, yet very costive. Likewise about a poore woman that is excessive bigg like a barrill notwithstanding she has bin delivered of a living child about seven or eight weekes. She complaines much of wind runing about

[22] V Mass. Hist. Coll., viii, p. 7, and R. C. Winthrop, op. cit., ii, p. 251.
[23] R. C. Winthrop, op. cit., ii, p. 258.
[24] R. C. Winthrop, op. cit., ii, pp. 217-218.
[25] IV Mass. Hist. Coll., vi, p. 97.
[26] IV Mass. Hist. Coll., vi, p. 112.
[27] IV Mass. Hist. Coll., vii, p. 127.
[28] IV Mass. Hist. Coll., vii, p. 131.
[29] V Mass. Hist. Coll., i, p. 30.
[30] It is well to state that she employed an amanuensis, so we must not blame the old lady for this spelling. V Mass. Hist. Coll., i, pp. 54-55.
[31] V Mass. Hist. Coll., i, p. 61.
[32] V Mass. Hist. Coll., i, p. 59.
[33] V Mass. Hist. Coll., i, p. 98.
[34] V Mass. Hist. Coll., i, pp. 104-105.
[35] V Mass. Hist. Coll., viii, p. 214.

her, and is sometimes in grate paine. Her thighes and legs weare as bigg as a boy's midle, but thay are much fallen. Much water has come from her of late, besids urin. She semes to be something better, and her stomack, which was quite gon, begins to com to her. The midwife thinkes there is neither dead child nor mola within her."[36] On other occasions Wait buys various medicines in Boston for his father such as opium, jalap, "vitriolum album," ivory, and aloes.[37] Once Wait wishes his father to send some black powder to him "if ther be opertunity, and you have any quantitye made. I am almost out, and have not convenyence to make any presently."[38]

But aside from attending to his family's ailments he had many professional obligations to perform as the most prominent men of the colonies, as we shall see, consulted him frequently in cases of sickness. His duty to a patient caused him to forego, at one time, the pleasure of meeting Francis Lovelace, the Governor of New York, at Milford. He was obliged to express his regrets for "he was ingaged to a deare friend not long before, who was at the very Agony of death (as was feared by all then present there) not to be absent till an apparent recovery, wch then was doubtfull, but now (god be praised) is in a good measure attained, but there were reasons to think it might not have beene so, if I had been fro home."[39]

Elder Goodwin of Cambridge, Hartford, Hadley and Farmington thanks him for attending his wife and child and declares success crowned his endeavors in regard to the treatment of the former and wishes as "the water she used is all spent," that "the ingreedients & direction how to use it" be sent them; "for we are very loath to breake ofe the use of such meanes as God hath been pleased to make so usfull to us in this case."[40] "His daughter was afflicted with the palsy and did not seem to be benefitted by the treatment. She was also with child. In a subsequent letter we learn that the water was for Mrs. Goodwin "to wash her leg with all" and more powder was desired to make it up "for she fyndeth more releife & ease of her greife by that meanes than by any other she hath formerly had the use of." The daughter does not seem to have improved.[41] He says, at another time, "my wife suspecteth that she (the daughter) is breeding child, only is not certain."[42]

John Higginson, then assistant to Henry Whitfield, the pastor at Guilford, Conn., writes a most earnest letter to Winthrop, at Pequot, in 1654 or 1655, begging him to come and see his wife. Higginson does not say what her sickness, was but declares "the case is such as cannot be judged without ocular inspection." He calls it "a very sad affliction, she being in a very dangerous case as Mr. Rosseter (the village doctor) & all our neighbours here doe apprehend." He hopes that Winthrop's "counsell & help, together with Mr. Rosseter" may be the means of preserving her life, "if so it pleas the Lord."[43]

John Mason, rendered famous by the Pequot War and subsequently Major General, Commander-in-Chief of the military forces of Connecticut and for eight years Deputy Governor, writes several letters expressing appreciation for physick and services rendered to his wife who "as yet remaineth ill, yet sometimes a little reviveing, with the addition of somewhat more strength."[44]

Thomas Mayhew, Governor of Martha's Vineyard and Nantucket, as well as preacher to the Indians there, though bowed down by over three score and ten years, cannot refrain from rendering his thanks for Winthrop's "readiness in sending that powder for my grandchild together with advice."[45] I will speak of this again in referring to Winthrop's sovereign remedy, Rubila. Mayhew, agreeing with Higginson as to the value of ocular inspection, wishes to know if Winthrop is willing "shee should com to Conectacute, where shee may be neare yow, and also the sight of hir may much more informe your judgment touching her disease." Subsequently Mayhew mentions an attack he had of what may have been appendicitis. He states the "paine I had seised one me in the morning betyme, uppon the right syde; the paine was not so broade as the palme of my hand. It was like to take me of the stage, but it went away in my sleepe that night; when I awoke, I was altogether free of that paine and of other sore paine which came uppon me in useing menes by a glyster to free my sellfe of that."[46] His last letter, written less than a year before Winthrop's death, tells us that one of his grand-daughters had used the physick sent with success but the little ones had not taken any[47] and we wonder if Rubila was not the remedy employed.

Captain John Underhill, of Long Island, heretical, eccentric and illiterate yet firmly convinced that God has made Winthrop "an instrument of the gud of mani diseased," desires relief for his wife "whom dayli continnuse in gret payne, resefing last yere a payne in her back with alift of a wayti stone and dayli increses her payne, and desense in to her left hip, so that shee can not torn her in bed, no gooe up rit in the daye."[48] And again he wishes Winthrop to help "a gud godli woman, and diere frend of my wife" whose distemper "is as a shoutting agew, pricking in her left side, asending into her tempels, and tieth, hed and jase, and takese her sometimse too dayse together and hase had it niere 12 months, with such extremiti as shee can not rest nigh[t] nor daye, and takes her at aell sesonse, night and daye, shiftting his course as an ago." He also hopes Winthrop will send his wife a "littil whit vitterall."[49]

[36] V Mass. Hist. Coll., viii, p. 385.
[37] V Mass. Hist. Coll., viii, p. 146.
[38] V Mass. Hist. Coll., viii, pp. 397-398.
[39] III Mass. Hist. Coll., x, p. 81.
[40] IV Mass. Hist. Coll., vii, p. 46.
[41] IV Mass. Hist. Coll., vii, p. 47.
[42] IV Mass. Hist. Coll., vii, p. 49.
[43] IV Mass. Hist. Coll., vii, p. 400.
[44] IV Mass. Hist. Coll., vii, p. 416.
[45] IV Mass. Hist. Coll., vii, p. 39.
[46] IV Mass. Hist. Coll., vii, p. 40.
[47] IV Mass. Hist. Coll., vii, p. 43.
[48] IV Mass. Hist. Coll., vii, pp. 182-183.
[49] IV Mass. Hist. Coll., vii. pp. 188-189.

Roger Williams, the ardent Quaker and founder of Rhode Island, was long one of Winthrop's correspondents. In 1649 he writes about his daughter, aged seventeen, who had "taken much physick and bene let blood but yet no change, she is advised by some to the Bay: I pray advize me to whom you judge fittest to addresse unto of the Bayes Phycitians."[50] At another time he speaks of his son troubled "with a spice of an epilepsie"; "We used some remedies," he says, "but it hath pleased God by his taking of tobacco perfectly (as we hope) to cure him."[51] Mention of Williams will again be made when we discuss Rubila.

Winthrop's "loveing freind," George Hethcote, from far off Barbadoes asks for something in 1669 "to stop the groweth of consumption." His mother had previously told him he had it, but he put, unwisely in this case, more confidence in his doctor, who informed him to the contrary. He goes on to add "I am much troubled with a thin sharp salt youmer that settles uppon me longes and causes me to spitt much and sume time cough but seldom—that powder I had of the for the spittinge did me much good." He wishes, consequently help in medicine and diet so that "the cause and ground of the consumption may be taken away if the Lord see good."[52] Possibly also about this time John Tinker appealed to Winthrop on behalf of his servant who was injured "by reason of a little stike run into his head through the hole of his eare." "We know not what to do," he declares, "I intreat your worshipps advice."[53]

Samuel Gorton of Rhode Island, "turbulent in disposition" and so constituted that "every community where in he cast his lot was anxious to get rid of him" but now tamed by his four score and two years, writes to Winthrop on August 11, 1674, of his "sore infirmitie and distemper which hath held him now almost a whole moneth of dayes." It was the "pain of stone in the bladder or stranguarion, or both." He says: "My provocation to make urine is painfull, and so is the act, and though I strive, yet but small quantitie issueth from me, which in short time reneweth in like operation; but in the night season, when I sleepe, or am upon any slumber, it doth issue from me insensibly, and I thinke more abundantly; and when I awake and am provoked therto, it is as aforesaid; insomuch that my disease is uncooth, being for and against. I strive after power expulsive, and also retaintive, but neither the one nor the other answers the desires and apointments of nature."[54] A month later, with a heart full of thanksgiving, he pours forth his rejoicings to Winthrop in a letter which takes up twenty-five octavo printed pages. The "cordiall and soveraighne powders" Winthrop had sent had so done their work he finds his body "to be little differing from that which it was, before the distemper seized" upon him.[55] Also another "infirmitie" which was a "benummednesse or like the crampe" is taken away. He wonders consequently "that a thing so little in quantity, so little in sent, so little in taste, and so little to sence in operation, should beget and bring forth such effects."

Edward Wigglesworth, a minister of the Gospel, thinking he strained himself when being hot he "tooke a lift" on a cold day in the winter, desires medical aid. He states some months after the accident "when I looked upyards being ready to fall backwards, and when I looked downward, to fall forward. And in my legs and feet benummedness, as if they were asleep by lying double under mee." Thinking it was the scurvy which he previously had, he neglected to use any means. As he grew worse the following autumn he used artificial baths, sixteen in all, and in the spring following "oiles, ointments plaisters" but all accomplished nothing. Finally a weakness affected his whole body so that he could "hardly move his neck a little." He greatly desired Winthrop to come to New Haven to see him.[56]

Two early Governors of Connecticut—Edward Hopkins and John Haynes—also need his services. Hopkins appeals to him to see if he can help his wife's condition. She was insane. Some "water" seems to have been sent which was given as directed but no "alteracion in her" was perceived.[57] Haynes has occasion many times to ask Winthrop's assistance on behalf of his wife. In 1649, he writes that his wife is yet in the land of the living but falls into her violent fits when she tries to sit up.[58] Some months later we hear that she "is yett alive, but this month or more was seldom free from her most violent fitts."[59] Shortly thereafter he wishes to send her down to Winthrop at Pequot but "this chimera seemes to obstruct." "For this ten weekes my wife has not hadd the course & custom of woemen uppon her, which formerly failed not, except with child." He wants to know if the medicine which has been prescribed may be safely given her in this condition.[60] Later he speaks of a "little alteracion of her fitts apearing, att times" and says he wants to send her down to Winthrop during the winter. If she could not come he would like to know if anything could be administered safely to her at such a distance.[61] A little later he states she is unable to come "for soe it is, what wee formerly conceited probable is now palpably manifest, she proves with child, and is now quick." He mentions also that she has "pain all over her, especially her right side; her water is very high coloured, with much weakness, only at present the burning is well abated." She has also a "short cough, breaths shorter, stuffed at the stomache, but rayses not ought." In a footnote he adds "my wife has paine alsoe on her left side, although the most is one the

[50] III Mass. Hist. Coll., ix, p. 288.
[51] III Mass. Hist. Coll., x, p. 28.
[52] III Mass. Hist. Coll., x, p. 76-77.
[53] III Mass. Hist. Coll., vii, p. 238.
[54] IV Mass. Hist. Coll., vii, p. 603.
[55] IV Mass. Hist. Coll., vii, pp. 504-631.
[56] III Mass. Hist. Coll., ix, pp. 296-297, and Bul. N. Y. Pub. Lib., N. Y., 1899, iii, pp. 395-396.
[57] IV Mass. Hist. Coll., vi, pp. 335-336.
[58] IV Mass. Hist. Coll., vi, p. 360.
[59] IV Mass. Hist. Coll., vii, p. 452.
[60] IV Mass. Hist. Coll., vii, p. 453.
[61] IV Mass. Hist. Coll., vii, p. 454.

right side, wher the incision was."[62] How much would we give to interpret what the operation was for! The remedies employed must have been somewhat effectual for we read her "violent fitts are but seldomm, her cough is abated, & herself able to sitt upp in a chaire at night for three or fower howres."[63] She fears however that the supply of the powder which is to prevent her fits will soon be done and craves a further supply of the same. A month later she continues to improve and new and fresh supplies of medicines are again asked for as the preventing phisicke is all spent as is all the rest almost, both drinke and powders."[64] She was also troubled with fainting fits and Haynes wishes to know "whether she might not take of red cowes milk as formerly she did of goates milke."[65] "A soare paine on her backe"[66] as well as other aches and ailments demand Winthrop's attention on other occasions. We imagine he must have grown weary sometimes in hearing and reading the long calendar of her complaints.

In New Haven Colony, Winthrop had as patients the families of a brilliant group of men—Eaton, Davenport and Leete. Theophilus Eaton, the first Governor of that Colony, was a pure and noble character. He was also a long suffering man by reason of his second wife who "seems to have been in the habit of venting a very ugly temper in the most outrageous language to the whole family, from her husband down to Anthony 'the neager.' For she slapped the face of 'old Mrs. Eaton' while the family were at dinner until the Governor was compelled to hold her hands; she pinched Mary, the governor's daughter by his first marriage, until she was black and blue and knocked her head against the dresser which made here nose bleed much; she slandered Mary, falsely impeaching her character, and in all points she seems to have been the type of the vulgar step-mother."[67] In Eaton's first letter he wishes Winthrop to come to New Haven from Pequot and sends a horse to him so that he could "advise, on arrival, for recovery of Davenport's health."[68] Again, thinking to send his daughter Hopkins in the "ffleete," he desires Winthrop's opinion as to the danger of a winter voyage.[69] He later states: "my wife with thankefulnes acknowledgeth the good she hath found by following your directions, but doth much desire your presence here, as soone as the season, & your occasions will permit, both in reference to my daughter Hopkins, and my daughter Hannah, who hath bin evercised these 4 or 5 dayes with vapours rising (as we conceive) out of her stomack into her head, hindering both her sleepe & appetite to meate, and apt to put her into fainting ffitts, whether from winde or the mother or from what other cause I cannot informe."[70]

Hearkening unto this request, Winthrop went down to New Haven and prescribed some remdies. We read that "daughter Hopkins tooke the first potion of purging physick he left and hath kept her bed since and my wife is in some doubt whether she should give her any more of it till she have your advise."[71] In 1655, Eaton informs Winthrop of daughter Eaton's death and wishes him to come, if his family could spare him, to see her husband, who complained chiefly of a cold, a cough and a "paine in the reight side." Some bloody material had been vomited up on three or four occasions.[72] The last information we have of the family is when we are told "daughter Hopkins hath taken some of her physick and it wrought kindly."[73]

William Leete, also a Governor of that Colony and later of Connecticut, for some reason or other, did not desire to employ Rossiter (the village doctor). He consequently, much to Rossiter's disgust no doubt, consulted Winthrop on every necessary occasion. At one time he writes "my wife entreats some more of your phisick, although she feareth it to have very contrary operations in Mr. Rossiter's stomack"[74]—an instance that professional jealousy existed in those days.

Leete's family caused him much concern. In 1658 he writes "our youngest childe, about 9 weekes old, haveing ever since it was 3 or 4 dayes old, hath apeared full of red spots or pimples, somewhat like to measles, & seemed allwayes to be bigg, and to hang over on the eye browes & lids; but now of late the eye lidds have swelled & look very red, burneing exceedingly, & now at last they are so sweld up that the sight is utterly closed in, that he could not see, nor for severall dayes, nor yet doth, & the verges of the lids, where they close, have a white seame, like the white heads of wheales, wherein is matter: it is somewhat extraordinary, such as none of our woemen can tell that they have ever seene the like."[75] This child, Peregrine by name, was doubtless the cause of many an anxious moment to his parents. Leete later writes of "his starting, & sometimes almost strangling ffitts, like convulsions, which have more frequently afflicted the infant of late than formerly." We are apt to conceive it probable he says to proceed from more than ordinary painful breeding teeth.[76] His eyes seem to be somewhat better from the use of a "glasse of eye watter" which was also used on other of the children so that "a little further recruit" of the same was desired. Peregrine did not, however, monopolize all the family troubles for his sister, Graciana, was a weakly puny thing and gathered strength but very little. Winthrop's treatment seems to have caused an improvement for shortly thereafter she began "to slide

[62] IV Mass. Hist. Coll., vii, p. 455.
[63] IV Mass. Hist. Coll., vii, p. 456.
[64] IV Mass. Hist. Coll., vii, p. 459.
[65] IV Mass. Hist. Coll., vii, p. 460.
[66] IV Mass. Hist. Coll., vii, p. 461.
[67] Johnston Hist. of Conn., Boston, 1887, p. 159.
[68] IV Mass. Hist. Coll., vii, p. 469.
[69] IV Mass. Hist. Coll., vii, p. 471.
[70] IV Mass. Hist. Coll., vii, p. 473.
[71] IV Mass. Hist. Coll., vii, p. 475.
[72] IV Mass. Hist. Coll., vii, p. 475. Samuel Eaton was the son here mentioned. After Gov. Haynes' death, he married his widow, of whose ailment we have previously spoken.
[73] IV Mass. Hist. Coll., vii, p. 476.
[74] IV Mass. Hist. Coll., vii, p. 548.
[75] IV Mass. Hist. Coll., vii, p. 539.
[76] IV Mass. Hist. Coll., vii, p. 542.

a chaire before her & walke after it, after her ffeeble manner."[77] She caused trouble, however, in the taking of her medicine and Leete asks for directions "to make her willing & apt to take it; for though it seemes very pleasant of itselfe, yet is she grown marvailous awkward and averse from takeing it in beer. Wherefore I would entreat you to prescribe to us the varyety of wayes in which it may be given soe effectually; wee doubt els it may doe much lesse good, being given by force onely."[78] Andrews' "starting fits"[79] as well as a "distemper which my son William's wife can best explain"[80] demand other letters to Winthrop. Leete also writes about a weak back which afflicted a neighbor's child.[81]

But John Davenport, the first pastor at New Haven, appears to have required Winthrop's services most. In all seventeen letters are to be found containing medical references, most of them are about his wife's prolonged illness but some concern himself. In 1653 he wishes to go to Pequot to confer with Winthrop over the state of his body. "My wife," he adds, "inclineth to our travayling with you to Boston, if you judge that a place and time fitt for me to enter into any course of physick."[82] Four years later Brother Herryman's eye caused Davenport much anxiety and he wrote much to Winthrop about it. He says the medicines sent gave some benefit "for it opened the liddes gradually by litle & litle, and gave him ease. But, upon the opening of his eyeliddes, they find that in the eyes, where the sight was, is a mattery substance which brother Peck thinckes flowed out of it (peradventure it is the chrystaline humor); he saith it is ragged, or like white ragges undissolved, which yet he thincks, may be easily dissolved; and from the ball of the eye groweth a carnous substance, which covereth the neather eye lid all over, and at the end of it, in the corner of the eye, by his nose, is a tumor of a pretty bignes. Hereby, his eye seemes to be as 2 eyes, to them that looke upon it; yet sister Herryman saith she can see his eye under that excrescence. The excrescence is red, & so is his eye. On the 5th day last he tooke the powder, which worked very well, but most upwards, which, sister thinckes, increased the swelling about his eye. Brother Peck thinckes that his eye hath no sense [in] it, nor can they yet say whether the sight is wholly lost, or not, till that white mattery substance be taken away which is before it." Herryman intended, until Winthrop's further directions came, "to put a little sugar candie into it for the present, which, he saith, may doe some good, & no hurt." Before this letter was sealed sister Herryman came into Davenport's study with the good news that her husband "could stirre his eye yesterday a litle, & this day more, & that the excrescence from the ball of his eye (which she likeneth to a wheate straw, & toucheth the underlid), lookes a litle paler then it did, that the eye lid growes more plyable, & he can open it a litle himselfe. That tumor by the side of his nose, she saith, is about the bignes of a litle pea. The white that covers the black & darke colour of his eye is as bigg as a penny, & in the middest of that is that ragged matter I wrote of before. Brother Herryman thinckes that he pricked his eye with a bodkin, & that might cause this ragged thing about his eye. Sister Herryman & he boath thinck that what you sent workes well; for he findes that he can stirr his eye, which before was as a thing dead & other good effects. He is alsoe at ease."[83]

From the account we have of her Davenport's wife must have been an intensely neurasthenic woman. In 1658 he states that she "hath bene, diverse times, this sumer, and stil is, valetudinarious, faint, thirsty, of litle appetite, and indisposed, sundry times, yet goes about and is between times better and cheerful, yet ordinarily, on the mornings, shee feeles a paine in the bottom of her back."[84] Later he speaks of her being "weake in her spirits and weake stomached."[85] On one occasion he adds in a postscript "My wife heares by one, in this Towne, that a Dr. of physic in England saith that conserve of Rue will hinder propagacon of children—She desires to understand your judgement concerning it."[86] For her various complaints Winthrop dosed her with Rubila (as I will mention later), "pilles" and other unknown medicines without marked beneficial effect. The last note we have of her is in 1667 when Davenport, finding her refractory in taking her remedies, writes in the depth of his despair to Winthrop, saying "my wife tooke out halfe of one of the papers, but could not beare the taste of it, and is discouraged from taking any more. I perceive that some speech from yourselfe would best satisfie her, but if God's providence puttes a barr in the way, we are called to submit thereunto."[87]

Davenport, himself, seems to have had a somewhat similar malady. At one time he states after a ride with the Governor my urine on returning home "grew so high coloured, that my wife thought it was bloody, and hath ever since continued very high coloured, and many times she observes a black settlement in it. I have been, for about a fourtnight, costive, though not wholly without stools, but once in 2 daies, at least, and of late once every day, I doe somewhat at the stoole—Degestio quidem pauca est, et cum difficultate quandoque etiam cum inani conatu egerendi quam tenissimum nuncupant medici. I am daily at least every morning, til I have breakfasted, troubled with a paine at the bottom of my belly, most usually on the left side, and at other times also after walking, yet my appetite and digestion are good, considering the season. For hot weather weakens, and almost prostrates my spirits, when it is extreme."[88]

[77] IV Mass. Hist. Coll., vii, p. 542.
[78] IV Mass. Hist. Coll., vii, p. 543.
[79] IV Mass. Hist. Coll., vii, p. 546.
[80] IV Mass. Hist. Coll., vii, p. 574.
[81] IV Mass. Hist. Coll., vii, p. 563.
[82] III Mass. Hist. Coll., ix, pp. 294-295.
[83] IV Mass. Hist. Coll., vii. pp. 490-492.
[84] III Mass. Hist. Coll., x, p. 21.
[85] III Mass. Hist. Coll., x, p. 36.
[86] III Mass. Hist. Coll., x, p. 46.
[87] IV Mass. Hist. Coll., vii, p. 531.
[88] III Mass. Hist. Coll., x, p. 35.

After a course of treatment "by the mercy of God," he declares, "my body is about to returne to its former state, the paine being much abated, and that difficulty and frequent *irritus conatus egerendi* ceasing in a good degree. I am now content to let nature acte of itselfe in hope that by God's blessing upon suitable diet, I shall be well againe, in due time."[89]

In addition to all these above named patients mention should also be made of a probable one, "Mrs. John Megs" of Guilford. In 1673, Joseph Eliot, Higginson's successor at Guilford, writes "John Megs" a letter of introduction to Winthrop. In it he asks aid for Meg's wife who has "a gentle beginning of fits of flatus hypocondriacus yt stir upon greife yet without violence for the present."[90]

The best known remedy Winthrop put up and dispensed was one of his own concoction, Rubila, whose method of making was handed down to his son Wait and grandson John. It is to the latter that Increase Mather wrote on June 23, 1718, desiring a considerable quantity of Rubila sent to Madam Winthrop, his mother, "for the relief of such as the Lord shall please to bless it for y^{ir} health."[91] But its composition was unknown from then on till Dr. Oliver Wendell Holmes deciphered a manuscript collection of the medical cases treated by Governor Winthrop from 1657-1669 and came across the following prescription. It was written, as most of them, in symbols which Holmes thus interpreted:

"Four grains of (diaphoretic) antimony with twenty grains of nitre with a little salt of tin making rubila." Perhaps, Holmes states, something was added to redden the powder as he constantly speaks of rubifying or viridating his prescriptions, a very common practice of prescribing when their powders took a little too much like plain sugar.[92]

Unfortunately it would seem from letters subsequently published that something was purposely omitted. Winthrop himself sends some of the powder to his son Wait, and remarks that it is not ground enough,[93] and Wait, on other occasions, speaks of some, of his own manufacture, which was not enough ground,[94] half ground,[95] or grossly beaten.[96] He says also "it is best to make it before the weather be hot"[97] and at another time, "the dog dayes will not be so good to medle with rubila in, so it must be deferred at present."[98]

This remedy appears to have been a cure-all. It was given as an antidote in case of fevers, as a preventative against fits, for "sweild legs," for colds, for colics, for agues—in fact for any ailment. In a letter to his brother, Fitz John, Wait states that he knows "no better antidote in feavers then the black powder, niter, snakeweed, lignum vitae, white cordiall powder, unicorn's horn, all of which you know the use of."

"Mix snakeweed and lig. vitae with niter to take in the morning; mix fower graines apeice of corall, oculi cancrorum, and ivory, to be taken at any time; thre or 4 graines of unicorne's horn mixt with the black powder at night; but remember that rubila be taken at the beginning of any illness."[99] Again, discussing Fitz John's distemper, he says that Rubila if taken "at the very beginning of it, must needs abate much of the maligntye of it, and so render it lesse dangerous."[100]

Many in different parts of New England kept a store of Rubila constantly in the house, from which the town was supplied whenever necessity arose. When the powder was exhausted more was written for. In 1653, Deacon Child of Watertown writes "my wife would entreate you to send her a parcell of your physick, devided into portions for young and ould. She hath had may occasions to make use therof, to the help of many."[101] Nearly a year later he says his wife is very ill and "often wisheth she had a ption of yo^r phisick by wch she & other have found good, & and is psuaded should doe again had she off it."[102] Davenport and wife are, also, among those who received bountiful supplies of Rubila on several occasions for themselves, their sick neighbors, and friends. It was once desired by Mrs. Davenport for the good of the people that needed it, yet she says, "she had rather have bene without it, then you should get hurt by sitting up too late."[103] This seems to imply that Winthrop might have spent some time in the making of it or that he chose the night season as he could then prepare it in secrecy, without any interruption. Later Davenport's supply is wholly spent so that though some have desired it they turned away empty.[104] Roger Williams of Rhode Island "sick of a cold and feaver" asks that this powder might be sent with directions. If the ingredients be costly, he will thankfully account. He then adds "I have books that prescribe powders but yours is probatum in this Country."[105] Again he asks for more as his wife wants some for Mrs. Week's daughter of Warrick.[106]

Though Winthrop died in 1676, yet John Allyn of Hartford, long secretary of Connecticut, had not forgotten the benefits he had derived from taking this powder and writes in 1681 to the Governor's son, Wait, for "a small portion of rubila to ly by if your store would permit it."[107]

[89] IV Mass. Hist. Coll., vii, p. 517.
[90] Proc. Conn. Med. Soc., Bridgeport, 1892, p. 216.
[91] VI Mass. Hist. Coll., V, pp. 380-381.
[92] Holmes: Medical Essays, Boston, 1891, p. 335.
[93] V Mass. Hist. Coll., viii, p. 144.
[94] V Mass. Hist. Coll., viii, p. 419.
[95] V Mass. Hist. Coll., viii, p. 427.
[96] V Mass. Hist. Coll., viii, p. 420
[97] VI Mass. Hist. Coll., v, p. 342.
[98] VI Mass. Hist. Coll., v, pp. 69-70.
[99] V Mass. Hist. Coll., viii, p. 429.
[100] V Mass. Hist. Coll., viii, p. 437.
[101] V. Mass. Hist. Coll., i, p. 167.
[102] V Mass. Hist. Coll., i, pp. 167-168.
[103] IV Mass. Hist. Coll., vii, p. 510.
[104] IV Mass. Hist. Coll., vii, p. 516.
[105] III Mass. Hist. Coll., ix, p. 268.
[106] IV Mass. Hist. Coll., vi, p. 275.
[107] VI Mass. Hist. Coll., v, p. 9. John Winthrop, Jr., had previously been the family physician. At one time Winthrop writes to his son Wait, "Tell Mr. Allyn his wife hath a tertian ague w^ch began the day he went hence, & we hope the worst of it is over. I was w^th hir this morning, & hir fit was shorter and more moderate then former." (V Mass. Hist. Coll., viii, p. 144.)

Thinking, perhaps, that too little would be sent he then says: "I used to take 8 grains at a time." Richard Wharton of Boston, also, desired some for his cold "which he could not yet shake off and thought that a full supply of it would have saved him a great deal of blood wch he had been forced to part with."[108] And Governor Haynes when John Winthrop was alive writes, too, for working physick or powder which benefitted his wife as "it wrought very kindly alwaies both causing vomiting and purdginge."[109] Subsequently the usual dose was not effectual for we learn twice it hath not wrought at all."[110]

The powder seems to have been rather nauseous in its taste and many objected to take it. It may have been the powder William Leete asks directions about for Graciana his daughter as "she is grown marvailous awkward & averse from taking it in beer."[111] Thomas Mayhew wants some more for his daughter, we learn, as she is now willing (probably after much urgings and inducements) to take it.[112] With Winthrop's great-grandson, however, no trifling was permitted. We read in a pathetic letter to his son which Wait has left us: "Poor little Tome taken yesterday with great pain in his stomach, belly, and side, like a plurettick feaver; your mother and most of the house up with him all night.[113] He took rubila this morning, and hope he is better." This might mean though that little Tome resisted the taking of this nauseous drug till the morning when, worn out and tamed, he took his medicine, as he ought, like a little man.

When Mr. Stone was sick Davenport endeavored to persuade him to take this powder but did not find him "inclinable, though he was burthened in his stomach." In the same letter Davenport states that Governor Newman took once Rubila, "but finding himself sundrie times ready to faint away, hath not been willing to take it againe, nor his wife that he should, though we persuaded and encouraged him thereunto."[114] Small wonder, then, is it that Wait Winthrop states "for feverishness & restlesness" he has found "nothing help like rubila when there has been *strength* to bare it."[115]

The dose generally was one to two grains, but this amount was at times exceeded for John Allyn, we saw, used to take eight grains at a time[116] and Mrs. Davenport took once 6 graines of rubila, and had 3 vomits and one stoole" but "lookes better from it."[117] On one occasion it was advised to be given in a "pill don up with bread."[118] For "Ashbyes extreemely sweld leggs" Wait Winthrop writes "if he would be persuaded to take rubila in such a proportion as would not work with him tho the fever be not over and to take it every day for som time, it wold insensibly and by degrees take away both the swelling and every evill symptom; he may begin with a grain, or halfe a grain, and so increase halfe a grain every day till it begins to make him a little quamish, and then the next time decrease halfe a grain or a grain, and then keep to that proportion." This dose would be rather a "cordiall for him than weaken him." It may make him costive and to overcome this, a "spoonful or two or molasses alone, or mixt with a spoonful of oyle, would be as good as anything."[119]

With such a demand for this powder we are not surprised that Wait is obliged, on several occasions, to send for large supplies of some of its ingredients. At one time he asks for "fifty pounds of nitre and twenty pounds of good tartar free from dust."[120]

Besides Rubila Winthrop prescribed niter ("which he ordered in doses of twenty to thirty grains to adults and three grains to infants") iron, sulphur, calomel rhubarb, guaiacum, jalap, horse radish, the anodyne mithradate (a shot-gun prescription), coral in powder form, amber and electuary of millipedes. He also used elecampane, elder, wormwood and anise, as well as unicorn's horn.[121] In 1658 Davenport sends him "his owne unicornes horne" which Mrs. Davenport had kept safe for him since he sent it to Mrs. Eaton.[122] Another remedy he probably used was one later in his son's pharmacopœia. It was known as oculi cancrorum and was sent him by Sir Kenelm Digby, who thus describes its preparation.[123]

"Beate to subtile powder one ounce of crabbes eyes (in latin called Oculi Cancrorum), then putt upon it in a high glasse (because of the ebullition) foure ounces of strong wine-vinegar. It will instantly boyle up extremely; let it stand till all be quiett; then straine it through a fine linon, and of this liquor (wch will then tast like dead beere; without any sharpenesse) give two spoonefulls att a time to drinke, three times a day: and you shall see a strange effect in a weeke or two."

Although Winthrop treated agues yet I hope he did not employ the following remedy, also sent him by Digby who claims to have had "infallible successe" with it:

"Pare the patients nayles when the fitt is coming on; and put the paringes into a litle bagge of fine linon or sarsenet; and tye that about a live eeles neck, in a tubbe of water. The eele will dye, and the patient will recover. And if a dog or hog eate that eele, they will also dye."[124]

Winthrop's life, which was thus devoted so largely to the public weal in his capacities as statesman and physician, was brought to a close on April 5, 1676, but the good which he wrought is not forgotten and will be ever cherished, even by future generations.

[108] VI Mass. Hist. Coll., v, p. 16.
[109] IV Mass. Hist. Coll., vii, p. 460.
[110] IV Mass. Hist. Coll., vii, pp. 461 and 466.
[111] Mass. Hist. Coll., loc. cit.
[112] Mass. Hist. Coll., loc. cit.
[113] VI Mass. Hist. Coll., v, p. 342.
[114] III Mass. Hist. Coll., x, p. 43.
[115] VI Mass. Hist. Coll., v, p. 336.
[116] Mass. Hist. Coll., loc. cit.
[117] III Mass. Hist. Coll., x, p. 36.
[118] VI Mass. Hist. Coll., v, p. 121.
[119] IV Mass. Hist. Coll., v, p. 106.
[120] V Mass. Hist. Coll., viii, p. 513.
[121] Holmes, op. cit., pp. 332-333.
[122] III Mass. Hist. Coll., x, p. 20.
[123] III Mass. Hist. Coll., x, p. 17.
[124] Mass. Hist. Coll., loc. cit.

PNEUMOCOCCIC ARTHRITIS: REPORT OF THREE CASES.

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That lobar pneumonia is an acute general infection, and not a purely local disease of the lungs, has long since been established beyond all dispute, and has been recognized as such in all modern text-books. Yet I think still further evidence may prove of interest, if not of value, to the medical world.

The first case reported below occurred in the service of Dr. Osler in the medical wards of the Johns Hopkins Hospital, and affords a good illustration of septicæmia from Fraenkel's pneumococcus without marked pulmonary involvement.

This is the first case that has occurred in the medical wards since the report of two cases by Cole in *American Medicine*, May, 1902, in spite of the fact that upwards of fifty cases of pneumonia have been under observation.

CASE 1.—*Clinical Summary—Acute lobar pneumonia* (rt. mid-lobe), *ac. pericarditis* (7th day), *arthritis of right shoulder* (7th day), *ac. vegetative endocarditis* (8th day), *meningitis* (9th day), *arthritis of right ankle* (10th day), *death* (11th day).

W. A. H., æt. 42; male; German; Med. No. 15,749. Admitted June 2, 1903, on the fourth day of the disease. Complaining of "fever."

Family History.—Negative, except for death of one child from "spasms."

Personal History.—Weakly as a child; no definite diseases of childhood beyond some "brain trouble;" pleurisy twice in 1878; typhoid fever in 1901; no other acute infections.

Head: Slight deafness in right ear since childhood; no history of discharge.

Respiratory: Subject to colds; always more or less cough with whitish sputum; no hæmoptysis; frequent night sweats, drenching night gown.

Alimentary: Vomited occasionally during past year, irrespective of food; diarrhœa since May 1, 1903, with 4 to 5 water stools; never contained blood.

Genito-urinary: Micturates once or twice every night for years; œdema of ankles since 1902; denies lues and tripper; no history of secondaries.

Habits: Used alcohol to excess since youth, beer, whisky, etc.; does not use tobacco in any form.

Present Illness.—Since the last week of May, 1903, has been feeling out of sorts; general lassitude; anorexia. About May 30 had chilly sensation, but no definite rigor; fever and drenching sweats during the same night. Much cough with fairly profuse muco-purulent sputum, never blood-tinged. Fever has been present since onset, more marked during the day. No nose bleed. No diarhœa for last few days.

Status Presens.—Admitted at 4 p. m. on June 2, the fourth day of disease. T = 98⅘°, P = 116, R = 24. T rose to 105.5° at 4 a. m. of 3d inst. R = 28, P = 116.

The note dictated by the resident physician, Dr. McCrae, on June 3 reads as follows: "Patient very ill; face flushed; mind dull; pupils equal and active; tongue slightly coated; mucous membranes of fair color; throat somewhat injected with some swelling on left side of uvula.

Thorax flat; expiration slightly less on right; percussion note over right front and right back slightly impaired; vocal fremitus, if anything increased on right side; breath sounds harsh but clear throughout left lung; rather higher pitched and more prolonged expiration on right.

Heart: P. M. I. in 5th i. s. 10 cm. from m. s. l. R. C. D. diminished. Sounds rapid; 1st much like 2nd. Pulse, 34 to ¼, very small, regular and not dicrotic.

Abdomen: Slightly full; no positive rose spots; spleen not felt.

Sputum: Tenacious, muco-purulent, slightly streaked with fresh blood; microscopically many pus cells, and clumps of bacilli and diplococci; no tubercle bacilli.

Urine: Negative except for slight trace of albumen.

Blood: Negative for parasites; leucocytes, 13,300.

June 4 (6th day).—T, which fell to 99.6° 12 noon of 3rd, has since ranged from 101.6° to 104.5°. P = 112-132, R = 28-32. Very restless during the night and slightly delirious. Signs of consolidation over right middle lobe more definite. Left lung clear. Heart negative. Leucocytes 10,400. Blood culture at 2 p. m. proved negative.

June 5 (7th day).—General condition about the same. T = 100.6°-104.2°, P = 96-130, R = 28-40. No change in physical signs of lungs. Heart: A few *suggestive scratches* heard over base of heart synchronous with systole. Pulse difficult to count owing to marked tremor of hands; very soft and small. Complains of pain in *right shoulder joint*. No redness, no swelling; slight tenderness posteriorly. Leucocytes 8,100.

June 6 (8th day).—Temperature rose to 105.5° at 7 p. m of 5th inst., but fell steadily during the night, reaching normal at 6 a. m. Rather cyanotic. General coarse twitching of both upper extremities. Signs of resolution of consolidated middle lobe. Left lung clear. Heart: Sounds at apex a trifle feeble but clear. Near the sternum in 3d, 4th and 5th i. s. is heard a *murmur with systole*, which has a curious, somewhat superficial scratching quality, suggesting a pericardial rub but not characteristic; audible at aortic area, where 2nd sound is somewhat accentuated. Right shoulder joint painful and tender, but not red nor swollen. Leucocytes 9,100.

June 7 (9th day).—T = 101.5°-104°, P = 108-120, R = 28-48. Patient semi-comatose. Pupils equal; no strabis-

mus. Stiffness of neck muscles marked. Arms flexed at elbow. Tendon reflexes of uppers absent. Patellar reflex absent. No ankleclonus. Babinski's sign doubtful. Kernig's sign marked. Inflammation of right shoulder subsiding. Blood negative to parasites. Leucocytes 10,200.

June 8 (10th day).—T = 101.4°-103.5°, P = 100-132, R = 28-44. Delirium rather more marked. Pupils equal and active. Does not answer questions. Marked general tremor, retraction and rigidity of neck. Kernig's sign pointed. *Right ankle joint* shows light swelling and redness, but no tenderness. Consolidated right middle lobe gradually undergoing resolution. Some area of purpura over right back. Lumbar puncture, 20 cc. withdrawn under normal pressure, negative in smears and cultures. Blood culture showed heavy growth of pneumococci in plates and flasks in 24 hours. Widal negative.

June 9 (11th day).—T = 102°-105.7°, R = 28-44, P = 100-140. Patient roused with difficulty. Pulse of fair volume, regular but distinctly *collapsing*. Pupils equal. Twitching of muscles of face, neck and arms. Other signs of meningitis as before. Right ankle joint shows more marked signs of inflammation. Heart sounds well heard at apex, second followed by a *diastolic murmur*, of maximum intensity in 2nd r. i. s; first clear everywhere. Marked pulsation in peripheral vessels; faint capillary pulse. Leucocytes 10,300.

Aspiration of right ankle joint at 7 p. m. yielded 2 cc. of turbid, milky fluid. Typical pneumococci in smears and cultures. Death at 9.05 p. m.

Autopsy performed 14 hours after death by Dr. Van Wart.

Anatomical Diagnosis.—Lobar pneumonia with gray hepatization (right lung); chronic adhesive pericarditis; ac. aortic endocarditis with ulceration of aortic valve; ac. tricuspid endocarditis; fatty myocarditis; atheroma of aorta and coronaries; cirrhosis of liver; chronic interstitial pancreatitis with fat necrosis and abscess formation; chronic nephritis and fatty degeneration of kidneys; ac. splenic tumor; meningitis; acute arthritis; hypertrophy of prostate.

Thorax: L. pleura contains 100 cc. of slightly blood-stained fluid. L. lung adherent at apex; right lung adherent at apex and upper part of lower lobe posteriorly. Left lung negative except for healed tubercle at apex. Right lung smaller than normal; scar at apex; middle lobe in condition of gray hepatization.

Heart: Pericardium adherent by recent fibrinous adhesions. Tricuspid valve (13 cm.) showed a large, pale, irregular mass on auricular surface, measuring 1 x 1.5 cm., pedunculated and floating free. Pulmonary and mitral valves normal. The aortic valve (8 cm.) showed slight sclerotic change. The right posterior cusp of the aortic valve showed recent vegetations and considerable ulceration, resulting in the right base of segment being eaten through and floating free. Myocardium soft, pale red, and on tangential section showed yellow streaks. On the coronaries patches of sclerosis.

Spleen (130 grammes): Soft and flabby; mottled; pulp soft and structure made out with difficulty.

Liver: 1650; slightly enlarged and of very irregular shape; on section there is considerable increase in connective tissue arranged about lobules.

Stomach and intestines negative.

Pancreas: 12 x 2.5 x 1.5 cm.; very firm, cutting with difficulty, except in head near lower border, where there is a small abscess cavity (1.5 x 1 cm.), communicating with duct of Wirsung. Throughout organ numerous opaque yellow areas with softened center. Connective tissue considerably increased.

Kidneys: Show characteristic changes of chronic nephritis.

Bladder: Negative; urine negative to sugar; hypertrophy of middle lobe of prostate.

Right ankle slightly swollen and on opening it the surrounding tissues were found to be slightly infiltrated with serum. The joint itself contains considerable quantity of purulent fluid, and the cartilage covering it has lost its smooth, glistening appearance. No evidence of extension of the process to the surrounding bone.

Brain: The calvarium more adherent to dura than normal. Dura normal beyond increase in number of Pacchionian granulations. Cerebrospinal fluid not increased. The pia and arachnoid somewhat opaque, as were the veins in the sulci, but not more so than usually seen in senile or insane brains. Pial arteries prominent. The circle of Willis showed slight sclerosis. Pons, cerebellum and cranial nerves apparently normal. Sections from various parts of cerebral cortex showed very few leucocytes, otherwise negative. Sections stained by Nissl's method showed the usual changes in the Nissl bodies in acute infections.

Bacteriological Report.—A. *Clinical.*—The first *blood culture* was taken on the 4th inst., the 6th day of illness; 12 cc. of blood were withdrawn from the median cephalic vein. This was divided between five Erlenmeyer flasks, each containing 150 cc. of medium; three of litmus milk and two of bouillon. They were incubated for 5 days at 37° C., but proved absolutely sterile.

The second blood culture was taken on the 8th inst., or 10th day of disease; 14 cc. of blood were withdrawn and divided between three flasks of litmus milk, two of bouillon and six tubes of agar-agar. The latter were plated. Next morning all six plates showed very numerous opaque, white, circular, pin-point colonies, which under low magnification showed sharply defined periphery and dark nut-brown color. Smears stained by Welch's method show typical lanceolate diplococci with fairly definite capsule.

In 48 hours all litmus flasks were acidified and coagulated, and the bouillon was turbid, while the blood was changed to dark olive green color.

The *lumbar puncture* taken on the same day was absolutely negative.

Culture from ankle joint, taken two hours before death.—About 2 cc. of blood-stained turbid fluid were withdrawn. This was divided equally between one bouillon tube, one slant agar tube and one blood serum slant. Smears stained by the ordinary stains showed numerous polymorphonuclear leucocytes, but no diplococci. The tubes were incubated for 12

hours, when 6 agar-agar plates were made. A series of three by adding with 5 öses of bouillon tube to first agar and so on to third dilution. The remaining bouillon was then divided equally between three other agar tubes and plated. The slant cultures proved negative, as did the plates in first 24 hours. In 48 hours the first series of plates was negative, but the second series showed few typical pneumococcus colonies, smears from which were stained and showed typical lanceolate diplococci with well-defined capsules.

The organism isolated from the blood and that from the ankle joint were run through the various media and showed typical growth in slant agar, glucose, agar, potato, bouillon, Dunhams, litmus milk and gelatin. On the former it was chiefly characterized by its very light, almost invisible growth; it acidified and coagulated milk; and in gelatin there was little or no visible growth and absolutely no liquefaction.

A 24-hour agar culture from each was inoculated intraperitoneally into two mice. The mouse inoculated with the joint organism died in less than 24 hours, and the organism was recovered in pure culture from the heart's blood, and peritoneum; smears showed beautiful typical capsules and the cultural characteristics were absolutely identical with those of the original stock. The mouse inoculated with the organism from the blood died in about 48 hours, and from its heart's blood and peritoneum diplococci with its typical cultural characteristic and capsule were demonstrated. This organism was not so virulent owing to the longer interval that had elapsed from its primary isolation.

B. *Post mortem.*—Owing to the absence of the bacteriologist, Dr. Van Wart kindly asked me to take the cultures.

Pleura, pericardium and spleen showed pure cultures of staphylococci pyogenes aureus.

The *heart's blood* showed few *pneumococci* in smears and on the plates, but transfers showed no growth.

From the vegetations on the aortic cusps, which was previously seared with a red hot knife, a small fragment was broken off and macerated in an agar tube. From it was recovered the pneumococcus with the B. proteus vulgaris and staphylococcus aureus.

The cerebral meninges yielded a pure culture of pneumococcus, and few pneumococci were demonstrated in the smears. The right ankle joint also contained pneumococci with a few colonies of staphylococcus albus. From the peritoneum: B. proteus vulgaris, B. coli communis, strept. pyogenes and staph. albus. From the pancreatic abscess: B. coli communis and staph. aureus and albus.

In this series, just as in the former, all the ordinary media were employed for identification, the only difference being that the organism was not run through a mouse in every case.

The above history is given in detail to depict more vividly the interesting sequence of events which occurred in the course of the disease.

The signs of consolidation of right and middle lobe were never absolutely typical but sufficient to warrant a diagnosis of consolidation at least. This, with the high though typical temperature curve, the leucocytosis, the delirium and the toxic facies all pointed clearly to lobar pneumonia. As the amount of lung involved hardly warranted the grave condition, a septicæmia of a very intense form was thought to be present, in spite of the fact that the blood culture taken on the 6th day of disease was negative. An arthritis of the right shoulder was suspected on the 7th day. This was soon followed by the development of an acute vegetative endocarditis of the aortic valve as shown by the appearance of a loud systolic murmur of maximum intensity in aortic region. On the following day definite signs of meningitis appeared. Then on the 10th day the right ankle joint became acutely inflamed. A lumbar puncture taken on the 10th day was negative, but the blood culture showed both in fluid and plate media a heavy growth of typical pneumococci. On the 11th an interesting development occurred: The pulse became collapsing and the systolic aortic murmur was replaced by a harsh diastolic. This at the time could not be explained, but the autopsy cleared away the difficulty, as it was found that the acute inflammatory process had ulcerated through one of the aortic cusps, thereby producing a considerable insufficiency of the aortic valves.

A culture from the right ankle joint was postponed as long as possible, as it was felt that the further the process proceeded the more chance there would be of getting some fluid from the joint, which showed apparently little or no effusion. The joint was aspirated about two hours before death and the pneumococcus later isolated.

The post-mortem findings confirmed the clinical diagnosis in most respects. The middle lobe of right lung was in the stage of gray hepatization. The adhesive pericarditis was suspected from the peculiar scratching sounds over body of the heart. The acute ulcerative endocarditis of the aortic valves has already been referred to. The involvement of the tricuspid valve was not suggested by the physical signs, though owing to the frequency with which the right heart is involved in acute infective endocarditis no surprise was experienced. The arthritis of the ankle joint was proved by additional cultures taken after death and by laying open the joint and seeing the inflamed condition of the synovia. The right shoulder was not opened.

The appearance of the meninges post mortem was not incompatible with ordinary œdema, and it was only by smears and cultures that meningitis was proved to exist, typical diplococci being obtained.

The hepatic cirrhosis and chronic nephritis were accounted for by the patient's alcoholic habits. The pancreatic abscess formation plays no part in the present history.

Owing to the kindness of Dr. R. M. Van Wart, assistant pathologist to the Bay View Asylum, I take this opportunity of reporting two additional cases in outline, the data of which he generously supplied.

CASE 2.—*Clinical Summary.*—Male; æt. 79; admitted on 3rd day of disease with lobar pneumonia; arthritis of left shoulder 7th day; right knee joint 8th day; left knee joint 9th day. Death on 9th day.

Anatomical Diagnosis.—Lobar pneumonia; acute fibrino-purulent pleuritis; acute purulent lepto-meningitis; acute purulent arthritis of left shoulder, right and left knee joints; acute splenic tumor; arterio-sclerosis; chronic nephritis; hypertrophy and dilatation of the heart; cloudy swelling of the heart, liver and kidneys.

The pneumonia was confined to a small area at the apex of the right upper lobe, involving about one-third of its substance. The meningitis was extensive, involving the vertex and base alike. The exudate was of a sero-purulent type, there being a large quantity of thin purulent fluid in the subdural and subarachnoid spaces. Smears from the exudate showed many typical capsulated diplococci.

The left shoulder and right knee joint contained large quantities of purulent fluid. Smears showed capsulated diplococci. The left knee joint showed only a small amount of clear fluid post mortem, though before death it was painful and red and swollen. No cultures, unfortunately, were taken.

Case 3.—*Clinical Summary.*—Female; æt. 69; transferred from insane pavilion to hospital for *mitral insufficiency* with loss of compensation and *general anasarca; lobar pneumonia* 10th day of disease; *arthritis of right knee*, 10th day; *death.*

Anatomical diagnosis.—Lobar pneumonia (gray hepatization); *acute vegetative mitral endocarditis; acute purulent arthritis; acute splenic tumor; cloudy swelling of heart, liver and kidneys; arterio-sclerosis; chronic nephritis; hypertrophy and dilatation of heart; chronic passive congestion of viscera; hydrothorax; ascites; general anasarca.*

The pneumonic consolidation involved only a small area on the apex of upper right lobe. The vegetations on the mitral valve were large, soft, easily detached and of very recent formation, resembling those of Case 1. The brain showed no evidence of any lesion, beyond congestion of the pia, and smears from it were negative. The smears from the mitral vegetation and joint fluid showed presence of typical capsulated lanceolate diplococci. No cultures were taken.

Many writers have reviewed the literature of this subject very extensively, and I shall only refer to two recent articles that have appeared since R. M. Slaughter's paper in *American Medicine*, April 18, 1903.

The first is a report of a case by N. Raw in the *Practitioner* for April. This was a most interesting and very unusual case. In addition to double lobar pneumonia, followed by double empyema, there was an acute glossitis, due presumably to the pneumococcus which was the forerunner of the pulmonary and articular involvement. This case of glossitis is the only one in the literature that I could find. The involvement of the left temporo-maxillary joint also is rare. The development of double empyema, from which the patient was ultimately convalescing at time of the report, forms the climax of this interesting case.

Only one other recent paper could I find in English, French or German literature, which has not been previously reviewed. The latter is one entitled "Einige seltene Lokalisationen des Pneumokokkus," by Zamfirescu, of Bukarest, which appeared in the Spitalul, 1903, Nr. 3 (Rumanisch), and was unfortunately inaccessible. In a review of it in the *Centralblatt für Innere Medizin*, Nr. 29, 1903, we learn that the writer reports three cases of unusual infection with the pneumococcus, one with arthritis and myositis, the second with infective phlebitis, and the third with myositis alone.

I append a table of my cases following the plan set by Cave, Cole, Herrick and Slaughter in their excellent monographs. These four cases bring the number of pneumococcic arthritis to seventy-two.

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6. Raw: A case of severe Pneumococcic Infection. Raw, The Practitioner, April, 1903.

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No.	Observer.	Date.	Age.	Sex.	Relation to Pneumonia.	Seat of Arthritis.	Nature.	Result.	Complication.	Treatment and Remarks.
69	Raw.	1903	41	F	During double lobar pneumonia.	Left temporo-maxillary joint.	Purulent.	R	Ac. Glossitis Double Empyema.	Incision and drainage of joint. Smears and cultures show typical pneumococci.
70	Howard.	1903	42	M	During pneumonia of rt. mid-lobe.	Right shoulder 7th; right ankle joint 10th day of disease.	Sero-purulent.	D	Septicæmia, ac. ulcerative, aortic and tricuspid endocarditis, meningitis, pericarditis.	Blood cultures on 10th day showed pneumococci in cultures. Aspiration from ankle joint showed pneumococci in smears and cultures, lumbar puncture negative
71	Van Wart-Howard.	1903	79	M	During pneumonia of upper lobe rt. lung.	Left shoulder 7th day; right knee 8th day; left knee 9th day.	Purulent.	D	Ac. pleurisy, ac. purulent, lepto-meningitis.	Pneumococci in smears from left shoulder and right knee and cerebral meninges at autopsy. No cultures.
72	Van Wart-Howard.	1903	69	F	During pneumonia of apex of rt. upper lobe.	Right knee joint.	Purulent.	D	Ac. vegetative, mitral endocarditis, ch. nephritis.	Smears from vegetation and joint showed pneumococci at autopsy.

THE PLAGUE IN INDIA.

A STUDY OF THE RESULTS OF THE HAFFKINE PROPHYLACTIC.[1]

BY B. ROSALIE SLAUGHTER, M. D., *Washington, D. C.*

I have felt much honored in being asked to read a paper before you, but my pride has not prevented me from realizing my temerity in attempting to offer anything new on a subject with which you are already so familiar through the interesting report of the Medical Commission of the Johns Hopkins University and their associates, and the various excellent compilations and articles which have been published in America.

These leave practically nothing more to be said as to the nature and forms of plague, and indeed cover all ground connected with it to such an extent that it will be impossible for me to avoid some repetition. There seems, however, to be some doubt:

1. As to the length of time during which Haffkine's prophylactic renders a person immune.
2. As to the length of time before it acts.
3. Whether it is injurious to those who are incubating the disease.
4. Why, in spite of England's systematic efforts to exterminate the plague, so little has been accomplished?
5. Whether the inoculation increases the liability to other diseases.
6. Whether Haffkine's prophylactic is of real value in reducing the plague mortality, since the latest reports from Bombay seem to show an increase in the plague death rate.

Therefore I have thought that it might be well to take up these few points rather than attempt to go further afield in the limited time before me.

Through the courtesy of foreign and native physicians, I was, during my two months' stay in India, enabled to visit the hospitals and infected districts in many towns in the different provinces where I was given opportunity to observe cases and conditions, and to consult records upon which I base this paper.

1. AS TO THE LENGTH OF TIME THE PROPHYLACTIC CONFERS IMMUNITY.

Mr. Haffkine told me that he had found his prophylactic afforded protection from 4 to 6 months, or the length of one epidemic, though in some cases he had known its power to last even longer. For example, he cited statistics compiled by the collector of Dharwar from researches made in the plague laboratory there, showing that the effect had not worn off after 18 months or 2 years.

The consensus of opinion in India is, however, that while it may be effective for a longer time, for 3 months it is absolutely safe. It is, therefore, the common practice among those who are working in plague districts to be reinoculated every 3 months, and it is not resorted to oftener, although in some districts it has been thought best to begin counting the 3 months from the date of the second inoculation, which is made about 20 days after the first inoculation, as this method of double inoculation has been found to be highly advantageous. For example, at Hubli, Dr. Leuman found the immunity possessed by the twice-inoculated to be 10 per cent greater than that possessed by the once-inoculated, and his experiments were so interfered with by the ignorance of the natives that he argues if reasonable account were taken of this, a juster statement would be to estimate at 20 per cent the increased degree of immunity conferred by the second inoculation within from 20 to 30 days.

He emphasizes this by calling attention to the statistics relating to the inoculation of the employes of the Southern Mahrátta Spinning Co., which was done by the wish of the native manager, Mr. Narayenrao.

There were 1173 mill-hands on the muster roll, and of these 1040 were twice inoculated, with a death roll of 22 or 2.11 per cent. 58 were inoculated once with a death rate of 8, i. e., 13.79 per cent. 75 refused to be inoculated and show a death rate of 20, i. e., 26.6 per cent. If the twice inoculated had died in the same proportion as the uninoculated, the number of deaths among them would have been 286 instead of 22, and if the once inoculated had died in the same proportion as the uninoculated their plague death roll would have been 16 instead of 8.

In India the dose is ordinarily 5 cc. and often more. In 1897, Mr. Haffkine caused himself to be inoculated with 10 cc., and frequently if the reaction is slight from the first inoculation of the standard dose of 5 cc., a larger dose is given at the second inoculation. I mention this because I have noticed that the dose of Haffkine's prophylactic put up at our Hygienic Laboratory in Washington is 1 cc., and have thought it possible that the greater success of its use in India might be due to the larger dose.

2. HOW LONG BEFORE THE PROPHYLACTIC CONFERS IMMUNITY?

The length of time before it acts has been found to be less than 24 hours. For instance, in the experiments conducted at Undhera, among the inoculated no death took place before the ninth day, whereas 11 occurred among the unprotected during that time; 2 on the third day; 1 on the fourth day; 3 on the fifth day; 2 on the seventh day; 3 on the eighth day. The number of attacks is, therefore, seen to have been immediately less among the inoculated, and as the villagers were divided into two groups as evenly as possible, there is no reason to suppose that there could have been fewer persons in the incubation stage of plague among those inoculated than among their uninoculated relatives,

[1] Read before the Johns Hopkins Medical Society, May 20, 1903.

therefore inoculation evidently *immediately* aborted the disease in these cases.

In India the opinion is that inoculation acts in exactly the same way that vaccination does. The incubation stage of plague being ordinarily from 2 to 10 days, the shortest case on record, that of Chinawl Kahn (reported by Surgeon-Major MacCartie, January 11, 1897), was 36 hours, still the prophylactic requiring only 24 hours to act will in that time either arrest the disease or modify its severity.

For example, the prisoners in Byculla Jail, all of whom were equally exposed to infection, were divided into two groups as exactly alike as possible, the members of one group inoculated, the others not. Out of the 172 of the latter group there were 12 cases with 6 fatalities. Out of the 147 of the inoculated there were only 2 attacks and no deaths. From the following table it will be seen that the difference between the two groups was manifest within 24 hours of the time of inoculation, thus showing that the prophylactic acted in 24 hours.

	Uninoculated.		Inoculated.	
	Cases.	Deaths.	Cases.	Deaths.
1st day	2	1	1	0
2d day	1	1	0	0
3d day	1	1	0	0
5th day	1	1	0	0
6th day	2	1	0	0
7th day	5	1	1	0

3. Is inoculation harmful in the incubation stage of Plague? In answering this I shall quote from a paper presented before the Royal Society of Edinburgh in September, 1900, by Dr. W. B. Bannerman, Major in the Indian Medical Service. He says:

"We find Calmette asserting before the International Congress of Hygiene at Paris, that 'a person in the incubation period for a slight attack of plague would find the disease considerably aggravated if he submitted during this period to a preventive inoculation of Haffkine's vaccine. The case would almost certainly end fatally.'"

Some months later the same scientist emphasizes this expression of opinion in the Harben lecture delivered by him in London, and condemns the practice of inoculating with Haffkine's fluid those who have been in contact with a plague case. These opinions he founds on laboratory experiments only, never having had an opportunity to use the plague vaccine during an epidemic among human beings. It is well known, however, that the immediate effect produced by the action of a microbial virus varies with each species of animal operated on, and that quite as various degrees of immunity are produced in them by this means, so that it is impossible without trial to predict what the exact action on any fresh species may be.

We must take experiments on animals as an indication merely of what may be expected if the same procedure be applied to man and it is quite legitimate, therefore, to set aside this dictum of Calmette's if we find from the examination of a sufficient mass of evidence derived from human beings that there is no harm apparent to those inoculated during the incubation stage of plague.

Inoculations have been carried out on a large scale in various parts of India, hundreds of thousands of persons (over 200,000 in Bombay city alone) having been operated on during the last four years. From the reports sent in from certain prisons and small villages, where accurate statistics have been kept, it has been found possible to compile the following table showing the case-mortality in persons inoculated during the incubation period of plague. These figures include all instances known to us in India where statistics have been kept with sufficient accuracy to admit of the compiling of this information:

	Attacks.	Deaths.	Case-Mortality per cent.
Cases which had plague actually evident at time of inoculation, or which developed it the same day.	43	21	48.8
Cases which developed plague on 1st day after inoculation	40	23	57.5
Cases which developed plague on 2d day after inoculation	40	22	55.0
Cases which developed plague on 3d day after inoculation	38	21	55.3
Cases which developed plague on 4th day	27	10	37.0
Cases which developed plague on 5th day	37	18	48.6
Cases which developed plague on 6th day	26	10	38.5
Cases which developed plague on 7th day	29	14	48.3
Cases which developed plague on 8th day	24	9	37.5
Cases which developed plague on 9th day	24	15	62.5
Cases which developed plague on 10th day	30	9	30.0
Total within the first 10 days after inoculation	358	172	48.04
Cases which developed plague subsequently	566	230	40.6
Total plague cases among the inoculated	924	402	43.5
Total plague cases among the uninoculated portion of the population during same epidemics	5,079	3,726	73.3

We have here records of over 6000 attacks of plague, with a case-mortality in the inoculated of 43.5 per cent, and in the uninoculated of 73.3 per cent. If Calmette's contention were correct, we should see a case-mortality of over 73.3 per cent among those who were inoculated either with the plague symptoms already manifest or who developed plague within the next few days. But what do we find? According to the table, we see that on no occasion does the case-mortality even approach to such a figure; even those inoculated with the disease already manifest have a case-mortality of 48.8 per cent only, instead of 73.3 per cent.

It appears that in these statistics we have a sufficiently large body of trustworthy evidence to enable us to set aside Calmette's warning—founded as they are on laboratory experiments on animals only—and to encourage us to inoculate *all* persons during a plague epidemic, whether they have been exposed to infection or not. One is further encouraged in this by the opinion of almost all of those who have had practical experience of the measure—for instance, Dr. Alice M. Corthorn, B. Sc. M. B., London, who, with her own hand, performed some 32,000 inoculations in the towns of Dharwar and Gadag, says: "I think that these and the Dharwar figures prove that, so far from its being inadvisable

to at once inoculate the contacts of a case of plague lest they be incubating the disease, it is desirable at once to inoculate all who have been exposed to infection."

Again, in a report on plague at Sydney, Australia, Dr. Ashburton Thompson, the Chief Medical Officer of the Government, and President of the Board of Health, reports: "Among the inoculated public, 13 were attacked . . . all these patients not only recovered, but had conspicuously light attacks. It was noticed that attacks which occurred at, or before the lapse of about 10 days, from the inoculation were not aggravated by it."

It may be stated that of the 13 cases noted by Dr. Thompson, 11 occurred within periods varying from the actual day of inoculation to the 7th day after the operation. Although I have not been able to find that the Indian Plague Commission considered this actual point, yet in their report they incidentally remark when considering how soon protection is acquired, that "the case-mortality of the first three days compares favorably with that of uninoculated patients," and in another place recommend "the encouragement of inoculation among persons left in the houses with the sick," thereby certainly implying that there could be no risk in such a procedure.

We may then confidently say that the plague vaccine is harmless to those incubating the disease.

This is reasonable in view of a similar condition in smallpox, for when a person is vaccinated after contamination, the disease is ordinarily aborted or modified. In rabies the addition of the attenuated virus of Pasteur to that already in the system does not aggravate the patient's condition. Although since Calmette's statement it has been said by those who also viewed the question theoretically, that the "adding of inoculation toxine to the virus the patient may already have in his system, will produce fatal results." The actual facts, collected from a wide experience with human beings, do not justify any such apprehension on this subject.

The line is, however, to be drawn when a person presents himself for inoculation with severe headache, tenderness in the glandular region, temperature of 100° F. or over, because the plague having then developed, the usefulness of a prophylactic measure is past.

In inoculating great numbers in India, it has sometimes happened that plague symptoms existed at the time of inoculation or have developed within the next 12 or 24 hours, but an observation of these cases has shown them to be negative, for they were no worse than those in the uninoculated, and no beneficial result was obtained. Of course if, immediately after inoculation, a patient developed headache, glandular enlargement which did not subside in a few days, etc., it would naturally be thought that the inoculation precipitated the plague. Thus the mistaken idea would arise, from the fact that the patient already had plague, and the symptoms naturally incident to the reaction following inoculation would be continued right on into the attack. It simply means that the prophylactic was not given early enough to abort the disease. The presumption that inoculation causes the attack is out of the question, as the prophylactic does not contain any living germs. We therefore arrive at the very important conclusion that persons in whose family cases of plague have occurred, or who are or were recently in attendance upon plague patients, or who have otherwise been exposed to infection, and may therefore have infection in them, but do not show actual plague symptoms, should be inoculated without hesitation, as early as possible, and in exactly the same way as ordinary persons, with every likelihood that they will benefit by it.

4. Why, in spite of England's persistent efforts to exterminate the plague, has so little been accomplished? For this there are several reasons.

First, because the earnest and intelligent work which is being done covers, after all, a comparatively small area of the great Indian Empire. Second, because, even if every case of plague in a town is cured to-day (after general inoculation the plague disappears in from 30 to 47 days) and the villagers persuaded to adopt the most hygienic conditions of living, by next year, their fright having passed, they will grow lax and indifferent. Many who have learned something of hygiene will have left on business or pilgrimage, and others will have come in from neighboring towns bringing with them utterly unhygienic customs. One of these that assists in rapidly spreading the plague in pneumonic cases, is that the patients expectorate into the hands of their sympathetic attendants.

3d. Natives who fly on the outbreak of the plague and live in shacks built on the moist ground and among whom ambulant cases develop, when they return bring with them attenuated bacilli, which under favorable conditions regain their virulence, and precipitate a new epidemic as soon as winter causes the people to come again in to close quarters.

4th. There will also be Mohammedans returning from Mecca, and Hindus from Benares, who will have been in contact with plague sufferers from Egypt, or other parts of the Orient, on the one hand, or with plague contacts from thousands of native villages on the other. Since in your last Bulletin, Dr. Calvert reports that the bacillus remains viable and virulent on dried pulverized organs of animals dead of the plague for as long as 48 days, and on paper or silk, in a room at ordinary temperature in the sunlight, for 18 days, it is easy to realize how readily infection is carried in the dark folds of Oriental garments, for it has been demonstrated that bedding and clothing may harbor bacilli for months, and in experiments they have been kept alive in crash for 97 days.

In the laboratory experiments conducted by Dr. Rosenau, of the Marine Hospital Service, and Director of the Hygienic Laboratory at Washington, he discovered that the plague bacillus lived and remained virulent 116 days in one case and 96 in another when abundantly inoculated into water containing organic matter. Now every one familiar with India and her numerous sacred tanks and wells, sheltered from the sun, and fetid with the decaying floral gifts constantly thrown into the water by devotees, will at once

recognize that here is one of the perennial sources of the bacillus pestis. Dr. Rosenau found further that "the bacilli are long kept alive in moist, cool earth," and as the dark, native huts are almost invariably built directly upon the ground, which is kept moist by water from these same tanks used in pouring libations to the household gods, it will be seen that all the conditions which laboratory research shows to be most favorable to the growth and preservation of the bacilli are actually and constantly in existence in the country most devastated by them.

These are some of the reasons why the work of the Government has to be done over each year.

Another interesting analogy between the laboratory experiments and the history of plague epidemics as they have been observed and reported, is that the one demonstrates the greater activity and virulence of the plague germs at a low, moist temperature, and the latter shows that, as a rule, the disease rages with greater violence during the rainy season and in the winter months.

The description of one house in Bombay will, perhaps, show the difficulty under which the Government sometimes works, and how, although the prophylactic is efficacious, the Yersin serum curative, and the plague officers faithful and watchful, the result in such a case is practically nil.

Entering the house, we passed through a long, narrow, dark hall, and came into a small court which though cleaned the day before contained old rags, human excreta, and decayed vegetables. From this we entered another passage, climbed a flight of rickety steps, and reached a short, absolutely dark hall. Opening from it was a room about 6 x 9 feet which had no window. Passing through this we entered a similar room, for the house was a veritable honeycomb of dark, foul chambers, lighted only by tiny, earthen lamps, standing in niches in the wall, and usually giving out more smoke and smell than light from their oil-soaked rag wicks. In one such room a woman was cooking; in another a man was dying, and in another a rigid outline under a heap of dirty rags showed that here lay a corpse. The authorities removed the dead, disinfected the room, and a small circle with a line through it, ⊖, was put on the house to show that a death by plague had occurred there. Above the central line was put the date of the person's death, and below it the date of disinfection. In the course of the night, however, the owner of the house removed all traces of the mark, because its presence depreciated the value of his property, and promptly rented the room as soon as possible to a pious Hindu who purified the place for his occupation by covering the floor thoroughly with cow-dung.

Doubtless while the disease was incubating, the plague victim had circulated freely among his neighbors, and it would be impossible for the authorities to disinfect the whole house without causing a riot on the part of the 150 other inmates who would consider it an unpardonable intrusion upon their privacy and an insult to their religion. It not infrequently happened that when the plague inspector was expected to visit a house if there chanced to be a plague corpse there, it would be propped up against the wall, or placed in the attitude of grinding corn, or of eating a meal. In reply to inquiries the relatives would reply "all well," and when night came the dead would be laid in the street at a considerable distance from where he had lived, or if the survivors could afford it, the body would be carried to the burning-ghat, the carriers often falling dead by the side of the pyre and the mourners returning to their homes scattering infection broadcast. And again, although the city is divided into districts each of which has an office in the middle of the street, to be easily accessible for reporting cases, and although special plague hospitals are erected and segregation camps are provided, so long as plague can be concealed it will be; because the natives dread returning from work to find wife or child carried off, they know not where, and themselves doomed to uncertain detention. For this means to them the death of a loved one among strangers, and a loss of wages for ten days, or of their position entirely.

Our natural question is, why do not the authorities compel the people to observe the laws of hygiene, and why do they not police more closely the streets and houses? This has not always been found to be an easy matter in America, and it is far more difficult in India. England has not forgotten the lesson of the Mutiny, nor the disregard of native prejudices, racial and religious, which caused it, and she knows that in all her work for the people she must move gradually and with caution, teaching them first of all to understand and appreciate her motives.

In this work as well as in that which they have done in the hospitals, the aid of the missionaries has been of incalculable benefit. One of the most active workers among them was Dr. Bertha Caldwell, of Johnstown, Pa., who thoroughly understanding the people among whom she had lived and done much excellent work, was able to gain their confidence and persuade many of them to be inoculated, when they had positively refused to submit to the operation at the hands of the plague officials who had come to the town at the beginning of the epidemic and were therefore entire strangers to them.

It would naturally be thought that the natives in seeing the benefit derived from inoculation in neighboring towns would need no argument or persuasion to induce them to submit to it themselves, but it must always be remembered that the plague is most active among the ignorant and superstitious, and that it requires infinite tact to overcome their belief in fatality and allay their suspicions that, since the Europeans suffer so little from this dread disease, it is either a curse brought upon them by the God of the Christians, or some scheme of the English Government to weaken and destroy them as a race. So persuaded are they of the truth of this latter assumption that it was often impossible for the plague officials to enter a house unless all the adult inmates in it were already dead, and only children left; these would be taken to the segregation camp, the house unroofed, the floor dug up and disinfectants liberally used.

One great difficulty in the way of effectively policing

the streets is that when the plague starts it spreads like wild-fire, so that often there are not enough living left to bury or burn the dead, and these latter are sometimes left lying in the streets until, as at Allahabad, where 20,000 died in a short time, the authorities were compelled to fasten long lines of corpses together, the ankle of one cadaver being tied to the wrist of another, and by means of mules drag them to the river and there cast them in for the crocodiles to dispose of. This method, of course, involved danger in spreading the infection further, as bits of the contaminated flesh were left on the stones by the roadside, but this was better than leaving whole unburied bodies in the streets and houses. Curiously enough, the grim undertakers to which the hapless victims of the plague are thus consigned, the crocodiles, are in no way injured by devouring these disease-infected bodies which are literally swarming with plague bacilli. Examination of the stomach of a crocodile soon after it was known to have eaten one of these corpses showed that the bacilli had been destroyed.

The same fact has been observed in the stomachs of the vultures which devour the Parsees who have died of the plague soon after they are laid in "the towers of silence."

This opens an interesting field of investigation.

From the foregoing explanations it will be seen that the struggle against plague in India must be carried on under conditions that we in America will never be obliged to face, so it is difficult for us to realize the difficulties under which England labors. The efforts of the physicians and their assistants have borne fruit wherever they have been able to handle small bodies of people systematically, and unhampered by native prejudice. In these cases the results have been so gratifying that many influential natives have asked to be treated by English methods, and have urged all their employes to submit to inoculation.

Among these are, His Highness Sir Aga Sultan Khan, of Bombay; Mr. Narayerao, and Parsi leaders like Mr. Jamsetjee N. Tata, and the distinguished Mr. Shanusul Telma Mody, and their example has led to an acceptance of the prophylactic as originally prepared. When it was first introduced by Mr. Haffkine the supersensitive consciences of the Hindus took instant alarm on account of the animal basis of the culture medium. To quiet the riots that ensued, Mr. Gibson, of the English Government Laboratory at Parel near Bombay, prepared a medium out of wheat, from which the starch had been washed, but in a short time the successful results from the use of the prophylactic were more effectual than many arguments in overcoming native scruples.

This fact, combined with the earnest and intelligent assistance given by such men as I have mentioned above, in furthering the efforts of the Government, is ground for much encouragement in expecting the material lessening of plague in India, and consequently in the world.

It is interesting to discover why, in spite of these facts, there is still an increase in the plague death statistics. One reason is that with the growing confidence in the authorities, cases in Bombay are no longer concealed, as they still are in some of the other towns, but are, each year, more fully and generally reported, therefore, although more cases do not really exist, more appear on the statistic sheets. In addition many cases of ambulant, septicæmic, pneumonic and intestinal plague formerly were not recognized as such, and were therefore excluded from the statistics. Again, the natives, seeing the good results of inoculation, went from absolute distrust of it to the other extreme, and now expect it to be infallible, and when a failure does occur are quick to call attention to the fact, and others point out the cases among the uninoculated with a scientific interest that formerly did not exist.

Another cause of the increased statistics is the present co-operation of the native practitioners with the English authorities, a wise step on the part of the latter, for it has had the result of inducing the former to report, instead of conceal, as they did at first, any case of plague coming under their notice. The Government has come to recognize that the native doctors have considerable skill in dealing with this disease, and that, when given a trial they succeed in curing a fair percentage of the cases under their care, and so put one of them in charge of a hospital in Bombay. The result of this innovation has been the growth of a much more friendly feeling on the part of the natives.

While in Bombay I tried to ascertain from the Hindu physicians what herbs they use in dealing with the plague, but was unsuccessful, for their empiric practice is carried on from father to son, and the secrets discovered by each one are regarded as "stock in trade" and are therefore zealously guarded.

Observations in India show that men are more suspectible to plague than women, but that when women are attacked they die in greater numbers.

And although the infant mortality in India is tremendous from other diseases, they are almost entirely exempt from the plague.

The native ideas concerning inoculation were very diverse. Some thought it would cure everything, and therefore sought it as a curative measure for many ills, and were greatly disappointed when their special disease failed to yield to the new treatment, sometimes going so far as to declare it had made them much worse. The native doctors themselves often asserting that the prophylactic increased the liability to other diseases among those inoculated.

Another opinion very widely held was that those who were inoculated would in four years' time inevitably develop leprosy. Since, however, that time has more than passed without a single case being recorded, it may safely be considered as purely imaginative.

5. Does inoculation increase the liability to other diseases?

Naturally since the introduction of Haffkine's prophylactic, a certain number of those inoculated with it who suffered from chronic diseases have died and some have recovered, so in order to settle the question whether the prophylactic itself had any effect, one way or the other, upon these cases, a record was kept of the yearly deaths among

the Sepoys, who are the picked native soldiers, and represent the healthiest body of men in India. This record was compared with a similar one kept among the same number of inoculated villagers, with the result that the number of deaths was found to be greater among the Sepoys, proving that so far from being injurious, inoculation improved the general health of the community.

After observing special cases, Surgeon-Captain Leuman reported eczema, particularly the pustular variety, frequently improved, and was sometimes cured after inoculation, while lupus in 4 cases that he noticed grew worse, and in a few cases of pulmonary tuberculosis the cough was aggravated, the temperature and early morning sweats increased temporarily, but there were no continued ill effects. This, however, has little significance, for the constitutional reaction caused by inoculation would reasonably add to the usual temperature of chronic tuberculosis.

6. The question as to whether the prophylactic really is of any benefit can, I think, be best answered by realizing its "as-a-matter-of-course" use in India, the injection of 5 cc. every three months during the plague epidemic being almost as customary as vaccination is here. The general immunity of doctors and nurses who have been inoculated is not a strong argument for the prophylactic, since they all wear shoes, and on account of their sanitary habits, are never, at any time, in very great danger, but experiments like that at Undhera are, on the other hand, absolutely convincing.

Undhera is a village 6 miles from Baroda, and there Mr. Haffkine, accompanied by Major Bannerman and a number of prominent men of that district, including local physicians, conducted a from house to house visitation, calling out the inmates of each by reference to a census paper. As each household was collected in the street half the number was inoculated, half left untreated, efforts being made to divide them equally as to age, sex, and conditions of health. As for example, in a certain family where there were 2 children, one sickly, the other strong, only the sickly one would be inoculated, but on the next similar occasion the procedure would be reversed, and in this way the population was divided into groups in as equal a manner in every way as can ever be done, but at the end of the day it was found that, owing to the insistence of the people, there had been 76 more inoculated than had been left untouched, and subsequent examination showed that there were, at the time of operation, more sickly individuals among the inoculated than in the uninoculated group. This shows that in the test made at Undhera, wherever an advantage existed, it was in favor of the uninoculated group.

Six weeks later, the Commission again visited the village, and again the inhabitants of the houses were called out by name, by reference to the census sheet, and with this result: 1st. Among the inoculated no deaths were found to have occurred from other causes than plague. 2d. There had been no deaths among them within eight days after inoculation, showing that the inoculation had had no deleterious effect. 3d. Among the 513 inoculated there were only eight attacks with three deaths, while among the 437 uninoculated there were 27 attacks of which 26 died.

One curious and pathetic incident of this second visit was that in 2 huts that stood side by side, *all* the uninoculated had died, and only the inoculated came out to answer to their names.

Earlier in this paper I have referred to the interesting fact that in this Undhera experiment 8 clear days elapsed before any deaths occurred among the inoculated, while during the same period 11 deaths from plague were registered among the unprotected, which seems to indicate that the prophylactic acted *at once*. If the inoculated had suffered to the same extent as their uninoculated relatives, they should have had 29 deaths from plague, instead of 3 only.

A striking illustration of the effect produced by the inoculation of an entire community is afforded by the history of the epidemic among the Parsi inhabitants of Daman. The Parsi community of Lower Daman numbered 306. Of these 277 were inoculated and 29 were not. The following shows the attacks and deaths in the two groups. No deaths from other cause than plague occurred in this community during the epidemic.

	Numbers.	Cases.	Deaths.	Percentage of Mortality.
Inoculated	277	8	1	0.36
Uninoculated	29	4	4	13.8

If the inoculated who were living in precisely the same social conditions as the uninoculated had been affected in the same proportion, they should have had 38 deaths instead of only one, a difference of 97.4.

It should be noticed that the solitary case of death among the inoculated Parsis had pain in the groin and fever at the time of inoculation—in fact was suffering from plague already manifest—and therefore could not be expected to derive benefit from the prophylactic.

In the Umerkhadi Jail, Bombay, plague appeared in the end of December, 1897. Three prisoners took the disease, and subsequently died. Then on January 1, 1898, inoculation was offered to the prisoners, who all, 401 in number, declared themselves willing to undergo the operation.

It was resolved, however, for the purposes of demonstration, that only one-half of each group of prisoners should be operated on. These consisted of groups of prisoners sentenced to simple imprisonment or to hard labor, civil debtors, convict warders, cooks and female prisoners. As each group was brought forward, the individuals composing it were seated in rows, and every second man or woman was chosen for operation. Two prisoners, only, refused to allow inoculation. No distinction was made between the groups of inoculated and uninoculated prisoners; they had the same food and drink, the same hours of work and rest, and the same accommodations. After this, plague cases appeared at intervals for a space of 30 days and were distributed as follows:

Average.	Population.	Cases.	Deaths.	Remarks.
Inoculated	147	*3	0	* The disease was so mild in these cases that the hospital authorities were doubtful whether they were cases of plague.
Not inoculated.	127	10	6	

My last illustration I shall quote from the report of the plague in Bombay Presidency compiled by Captain J. K. Condon.

Plague cases began to appear in Belgaum—a town of 40,700 inhabitants—on October, 1897, 5 deaths being reported in that month. In November, 111 deaths occurred, 156 in December, 226 in January, and 50 in February, after which an insignificant number of attacks took place, till in May the epidemic ceased. The Twenty-sixth Regiment of Madras Infantry were, during this period, living in lines close to the cantonment and city, and suffered similarly. The first reported case among them took place on November 12, when Sepoy 2224, Govindswamy, was brought to hospital and died the same day. Next day another Sepoy was attacked and also died. On the 15th, a drummer was seized, and on the 17th, the disease appeared among the followers. By the 31st, 13 attacks had been reported from the lines, 4 of these being among Sepoys. On the 22d of November, the companies most severely attacked were moved out of camp, and by the 28th the whole regiment, families and followers had left the lines. These quarters were then disinfected by washing with perchloride of mercury solution, whitewashing, and removal of tiles from the roofs. During this transition period 15 persons were seized, 6 of them being Sepoys. In the ten days following removal from camp, 13 Sepoys and 20 among the families and followers were attacked. Then removal from the infected quarter had its usual effect; the cases gradually became fewer, and ceased by the end of the year. The following table summarizes the events of this period, i. e., 12th of November to 31st of December, 1897:

Among Sepoys, 34 cases, with 22 deaths = 64.7 per cent mortality.
Among women, 20 cases, with 10 deaths = 50.0 per cent mortality.
Among children, 16 cases, with 9 deaths = 56.25 per cent mortality.
Among followers, 8 cases, with 8 deaths = 100.0 per cent mortality.

Total, 78 cases, with 49 deaths = 62.8 per cent mortality.

An officer of the Plague Research Laboratory was sent to Belgaum, and commenced operation there on the 24th of December. No difficulty was experienced in persuading the men to consent to inoculation; and all the Sepoys who were off duty that day in the Hindalgi camp (229) were operated on during the morning, and allowed to return to their lines next day. Those in other camps and the families were speedily inoculated and allowed to return also. The return was complete by the 30th of December. A few more inoculations continued to be done up to the 6th of January, 1898, among followers and children, but the regiment was practically a completely inoculated community by the end of the year. The total operated on was 1665 out of a population of 1746 living in the lines at that date. The 81 not operated on were infants, women far advanced in pregnancy, and the sick in hospital.

After this date two cases occurred in January, the sufferers being a European officer and a Sepoy, both employed in disinfection work in the town; they had both been inoculated and both recovered. No cases were reported for the next 6 months, though, as shown above, the epidemic was at its height in the neighboring city and cantonment in January, and the men were allowed to go to these places freely after inoculation. That this practical immunity of the regiment was not due merely to the disinfection of the lines will be manifest to anyone studying the occurrences during the second epidemic from July to December, 1898, now to be described. The second epidemic in Belgaum town began in June, reached its height in October, and thereafter declined till January, 1899, when it ceased. The table given shows the number of deaths from plague (the attacks were, of course, many more, but no accurate figures are forthcoming on this head) reported in the city and cantonment, month by month, contrasted with the attacks and deaths in the regiment:

Dates.	Deaths reported from City and Cantonment.	Attacks in the Regiment.	Numbers of those attacked in the Regiment, who died.
June, 1898	14	..	..
July, 1898	215	1	1
August, 1898	304	2	1
Sept., 1898	698	2	1
Oct., 1898	999	4	2
Nov., 1898	275	2	1
Dec., 1898	65	1	0

From the above it is manifest that the numbers attacked and the subsequent fatalities in the regiment kept pace exactly with the severity of the epidemic in the neighboring town, rising and falling with it. The conclusion is therefore inevitable that the same infection that was producing such havoc in the civil population was equally present in the lines of the military, yet they suffered in proportion 22 times less at the height of the epidemic. In the city and cantonment, 257 persons died of the plague, or 1 in every 17 of the population, while in the Sepoy lines, with a population of 1801, but 6 died, or at the rate of 1 in every 300 only. It has been shown how heavily the regiment suffered during the first epidemic; why, then, did they not again produce cases to the same extent during the second and more severe visitation? Some sanitary measures were taken by the authorities during the epidemic in placing the cantonment and city "out of bounds" for the troops, and disinfecting the few huts that became infected, but these proved totally inadequate to stay the ravages of the disease.

A very practical answer to this question was given by the Sepoys themselves, who volunteered to undergo a second inoculation, which was duly carried out in July and August. Practically no one was left in the lines unprotected by inoculation, so that a comparison cannot be made with an unprotected population living in precisely similar circumstances, as was possible in the first experiment in the By-

culla Jail, yet, in the opinion of the Sepoys and their officers, there is no doubt that inoculation rendered them entirely immune.

There is one indirect danger which has been realized in connection with immunity, i. e., the protected, feeling themselves safe, have gone freely among the plague-stricken, and then have attended to their various occupations, and in this way have spread infection.

In summing up the benefits of the prophylactic we may say: 1st. It renders a person immune for 3 months.

2d. It acts within 24 hours.

3d. When inoculation is given in incubation stage of disease, that is, before signs of plague appear, it has, in many cases, the power to abort the disease.

4th. Inoculation has no effect on other diseases, except, possibly, eczema, which appears to be benefited by it.

5th. Inoculation confers a high degree of immunity and greatly reduces the number of plague attacks.

6th. When, in spite of inoculation, a person is attacked his chances of recovery are greatly increased.

PROCEEDINGS OF SOCIETIES.

THE JOHNS HOPKINS HOSPITAL MEDICAL SOCIETY.

Monday, January 19, 1903.

The meeting was called to order by Dr. Osler.

Exhibition of Specimens: Intussusception, Tuberculosis of the Kidney, Carcinoma of the Kidney, Hydronephrosis of the Kidney and Hematoma of the Abdominal Wall. DR. CULLEN.

DISCUSSION.

DR. OSLER.—Dr. Cullen is to be congratulated on such a brilliant series of surgical cases. The case of tuberculosis of the cæcum is, I think, the first to be shown here illustrating that remarkable type of local intestinal tuberculosis which has been attracting so much attention of late, namely, a hypertrophic colitis, simulating tumor and which when found at autopsy or at a surgical operation may be mistaken for a tumor because of the solidity, firmness and the apparent absence of the ordinary features of tuberculosis. It is interesting too as showing how far the condition may progress without any of the usual features of tuberculosis; there were no ulcerations and no tubercles on the surface and yet histologically it was a true tuberculous process.

I would ask you to contrast the hydronephrotic kidney with the cystic kidneys which I demonstrated at my clinic on Saturday last. The conditions are totally different, this being due to some structural trouble in the early years of life resulting in a gradual distension of the calices with complete destruction of the organ.

Exhibition of Cases. DR. RANDOLPH.

DR. RANDOLPH.—The cases which I have to show this evening are all of the same character, cases showing the results of recent operations to recover pieces of steel from the back of the eye. The first mention of the magnet being used for extraction of steel from the eye is recorded in 1874. At that time the ordinary magnet such as you are all familiar with was employed and an incision was made in the sclera to extract the foreign body. In 1879, Hirschberg invented the electro-magnet such as the one you see before you. This instrument was used until 1893, by most ophthalmic surgeons but it must be remembered that a magnet of this size is nothing more than a magnetic probe, that is to say the point of the magnet if not brought in contact with the foreign body must at least be brought very near it. A great advance in this class of operations was made in 1893, when Professor Haab of Zurich, introduced the giant magnet. With his instrument it is not necessary to see the foreign body. It is a very large instrument weighing 200 pounds, and the patient has to be brought close to the magnet and if there be a foreign body in the eye an impulse forward is noted and the patient feels pain. The great disadvantage in these large magnets, however, is the danger of injuring parts of the eye which were uninjured previously by the foreign body. The object is to draw the foreign body from the back of the eye into the anterior chamber and then to extract it from this point but the foreign body is apt to take the most direct route to the magnet which is often through the iris and hence the danger of drawing pieces of steel through uninjured parts of the eye.

These considerations induced Lippincott, Johnston and Sweet to modify the magnet and to use it in connection with the X-ray apparatus. The magnet made by Sweet is the one we employ here and it has been found adequate to these operations. It is not nearly so large as the Haab magnet, weighing only about 35 pounds, but has a lifting force of 78 pounds. I take this opportunity to thank Dr. Sweet of Philadelphia, for the work he has done in connection with these four cases. His method of localizing pieces of steel in the eye seems to me absolutely accurate and in every case he has located the foreign body exactly where it was subsequently found. The foreign body is not pulled blindly forward, but located, after which an incision is made through the sclera near the spot and the magnet is brought close to this opening. In one of these cases the piece of steel was very near the optic nerve and the magnet had hardly reached the eye when the foreign body jumped out of the wound. All of these patients came to me since June, and all were from the Baltimore and Ohio Railroad shops. They all show the value of extracting the foreign body as soon as possible after the injury. For instance, the first case was operated upon on the third day and he has the best vision of the four. The next case was 18 days old and his vision is practically gone but still he has the eyeball and when one thinks that not long ago such eyes were doomed to enucleation he can see the great advance in this domain of ophthalmology. The

third case has only light perception, while the fourth whose foreign body was removed on the fourth day will have useful vision. Haab has recently reported 165 cases of removal of pieces of steel from the interior of the eye-ball and of these 55 recovered useful vision. The method, then, in many cases saved sight and in many more preserved at least a sightly eye-ball.

Report on the Prevalence of Uncinariasis in the Southern States. Illustrated with Stereopticon Slides. DR. STILES.

An account was given of a trip made through several Southern States to study this disease. It was found that Uncinariasis existed in North Carolina, South Carolina and Georgia, and the following conclusions were reached: 1. It is pre-eminently a disease of the sand-hills. 2. Cases occur in groups and several members of the family are generally affected. 3. It is more severe among whites. 4. Although it occurs among adult males it is most severe among women and children. 5. The danger of infection is greater in the summer, as a freezing temperature is fatal to the eggs and embryos. 6. Miners, farmers, brickmakers and their families are most frequently affected.

DISCUSSION.

DR. OSLER.—I am sure we all feel deeply indebted to Dr. Stiles for this most interesting lecture on subject of such natural importance, and we can congratulate him on a most brilliant piece of clinical work. It is very gratifying to think that it was done by a member of the Marine Hospital Corps, to which we are indebted for so many important studies in hygiene and epidemiology.

I do think these facts should be brought before the physicians and the educated people throughout the South so that the matter can be brought home practically to these unfortunate sufferers. This work of Dr. Stiles will have important economic results and be the means of relieving a large class of people.

February 2, 1903.

The meeting was called to order by the President, Dr. Williams.

Sarcoma of the Tibia. DR. BLOODGOOD.

Two months ago a giant celled sarcoma was removed from the medullary cavity of the upper part of the tiba and since the operation I have examined the granulation tissue which has grown from the bone cavity, and find no evidence of any cells similar to those in the tumor. At the last dressing, two or three days ago, I found that all of this red granulation tissue which you see lining the bone cavity was infiltrated with bone.

In the clinical history this case illustrates very well the character of this form of sarcoma, the least malignant of bone tumors, and also illustrates the connection between trauma and bone tumors. Some nine years ago there was an injury to this bone and ever since that time the patient has felt some tenderness and at times pain in the head of the tibia. He did not notice any swelling until about three years before coming under my observation. It was difficult then to make out a swelling, but the X-ray photograph showed a lighter shadow in the upper end of the tibia than in the normal bone. At below the operation the tumor looked like very hæmorrhagic granulation tissues and could be peeled from the shell of bone without any difficulty. Of course we used the curette and chisel as much as possible to get beyond the bony growth and I think it safe to say that this is normal granulation tissue filling the cavity.

Exhibition of Two Cases of Radicular Paralysis of the Brachial Plexus. One from the Pressure of a Cervical Rib with Operation. The Other of Uncertain Origin. DRS. THOMAS and CUSHING.

DR. THOMAS.—*Case I.*—The first patient (Dis. Nerv. Syst. No. 13,222½, Hosp. Surgical No. 13,651) which I present to you to-night has interested us very much on account of the difficulty of diagnosis and of the number of opinions that were held concerning the condition which caused her trouble. She was sent to the Neurological Dispensary in April of last year. She then gave the history of having suffered a great deal from pelvic trouble, subsequent to the birth of her child, which took place when she was 16 years old. She was treated at the Hospital of the University of Maryland, and I believe that both tubes and ovaries were removed, for an inflammatory condition, said to have been due to a gonococcus infection. Since this time she had suffered from various nervous symptoms, fainting attacks, and the like; but nothing of very serious moment. Three months before she came to us, she, however, began to have intense pain in the right arm. This pain was paroxysmal in character and seemed to shoot down the ulnar side of the arm, and was so severe that it incapacitated her. The arm had become weak and the muscles of the hand had begun to atrophy. She also complained that the leg on the same side was somewhat weak .

Upon examination we found a healthy looking young woman of 19 years of age, who did not appear markedly neurotic. The whole right arm was weak, but this weakness was most marked in the intrinsic muscles of the hands, and these muscles showed evident atrophy. The electrical examination showed the reaction of degeneration in the small muscles of the hand, but the other muscles all acted normally. At first we did not discover any disturbance of sensation, although we tested for it. This I am now inclined to believe was a mistake, as on later examinations a very definite area of anæsthesia was discovered. This area occupied the ulnar aspect of the forearm and extended somewhat above the elbow. It involved touch, pain and temperature. We were at first inclined to regard her trouble as a localized neuritis and she was treated for the relief of this condition. She was given electricity daily and appropriate internal medication. There was, however, no improvement in her condition and the pain was so severe in character as to suggest strongly that it was due to irritation of the spinal root; and, as she complained more and more of weakness of her right leg, we began to suspect that there might be an intraspinal growth pressing upon the spinal cord. Upon testing, it was found that the whole right leg was quite weak; the deep reflexes were active, although not more so on the right

than on the left. There was, however, a definite dulling in her perception of pain and temperature over the right leg, and right side of the trunk. In spite of the fact that the disturbance of sensation was on the side of the supposed lesion, instead of on the opposite side, I felt that there was probably some central trouble, and she was admitted to the surgical ward under the care of Dr. Cushing, who had seen the case with us on different occasions in the dispensary. He thought he could make out by palpation the presence of an extra cervical rib; this was confirmed later by the X-ray picture. These findings, of course, threw doubt upon the diagnosis of a central trouble, but as the presence of a cervical rib could not explain the symptoms referable to her leg, there was still some uncertainty. While she was in the hospital it was possible to examine her more carefully and we then discovered that the disturbances of sensation, which were present on the right leg, extended over the whole right side of the body, including the head. It was quite easy to distinguish the area of absolute loss of sensation on the inner aspect of the right arm from the general lowering of sensibility throughout the whole side. The weakness of the right leg involved all the muscle groups and did not have the selective quality so characteristic of involvement of the pyramidal tracts. Dr. Cushing also demonstrated areas of more definitely disturbed sensation over the chest, which could not be determined at other times. These facts, taken with the history of convulsive attacks and other neurotic manifestations, made it evident that we had to do with the combination of a definite local lesion (pressure on the lower part of the brachial plexus from the cervical rib) and a functional or hysterical condition. Dr. Cushing, as I hope he will tell you, removed the rib, and since then the patient has been entirely relieved from the intense pain, and there is improvement in sensation in the area over the ulnar aspect of the arm. She still has hysterical manifestations from time to time. As you will see, however, the muscular condition of the arm has not changed, and the electrical condition is just as it was before the operation.

RADIOGRAPH OF CASE I.
SHOWING RUDIMENTARY CERVICAL RIBS.

Dr. Cushing.—There is little to be said concerning the operative features of this case, its chief interest, as Dr. Thomas has pointed out, having centered in the question of diagnosis.

The anatomical distribution of the symptoms in the right arm, namely, the radiating pain along its post-axial border, the area of anæsthesia in the cutaneous distribution of the ulnar and the atrophy of the intrinsic muscles of the hand, all indicated a lesion of some sort involving the lower cord of the plexus or the root of the first dorsal nerve. With the patient's head in a lateral position, a distinct and what seemed to be a bony resistance could be made out on deep palpation over one point in the right supraclavicular triangle. There was considerable tenderness at this point and pressure caused pain, akin to the patient's spontaneous pain, to shoot down along the inner side of the arm. There was no undue prominence of the subclavian artery.

The radiograph, which Dr. Deetjen was kind enough to take for us, clearly demonstrated the presence on the right side of a bony projection, 2 or 3 cm. long, extending from the transverse process of the 7th cervical vertebra. The shadow from a corresponding but even less well developed process was evident on the opposite side (cf. Radiograph, Case I).

Thus the suspicion that a rudimentary cervical rib might be the cause of the radicular symptoms was fortified and it seemed presumable that the hemilateral lowering of sense perception on the trunk, which Dr. Thomas has described, was of a functional nature and merely superimposed on symptoms due to a definite organic lesion.

The operative procedure was a simple one. By reflecting a curved skin flap, the contents of the posterior cervical triangle were brought into view and it was found that the lower cord of the plexus was compressed by a dense fibrous band which passed from the tip of the rudimentary rib under the plexus to its point of attachment on the first thoracic rib. This band, therefore, representing the continuation of the rudimentary rib and over which the lower cord of the plexus arched at rather an acute angle, was the offending agent rather than the bony projection itself. The band, together with the cervical rib, was excised, precautions being taken in the procedure to avoid the great vessels and the underlying dome of the pleura. These structures have oftentimes been injured in the attempt to remove cervical ribs in case the latter have been more developed than the one in our case. The precaution was taken also not to shell the rib out of its

periosteal sheath, but to remove the structure in its entirety in order to insure no subsequent new formation of bone.

The functional hemi-hypæsthesia disappeared at the time of operation; at all events, no disparity in the cutaneous sensibility on the two sides of the body could be made out on the following day, nor on later examinations. There was likewise an immediate relief to the patient's subjective radiating pain and since the operation the area of ulnar anæsthesia has gradually disappeared. As Dr. Thomas has stated, there has been no restoration of motion in the paralyzed muscles and it seems quite probable that this may only be regained by a nerve anastomosis between the ulnar and median nerves. It is interesting to note that Borchardt before the *Berliner medicinische Gesellschaft* about a year ago reported the case of a patient with a cervical rib in whom a hyperæsthesia of the entire right side of the body coexisted with sensory and motor symptoms in the arm. Oppenheim in the discussion of this case attributed this hemilateral sensory disturbance to the presence of a spinal gliosis, pointing out that the supernumerary rib and the gliosis were both congenital anomalies and might naturally appear in the same individual. He had seen another patient with a cervical rib, in whom there were associated hysterical symptoms similar to those which Dr. Thomas has described in this case.

DR. THOMAS.—*Case II.*—The other patient (Hosp. Surgical No. 14,310, Dis. Nerv. Sys. No. 14,162) whom I wish to show you is particularly interesting on account of the similarity of her condition to that which you have seen in the first case. She is from the South, and came to the hospital complaining of a crippled hand. She is now in the surgical wards of the hospital under Dr. Cushing's care, and he has asked me to present the case. She is a young woman of 21 years and a milliner by occupation. She gives an excellent family and personal history, except that when she was about seven years old she had a curious attack of weakness of the right arm. This trouble, she says, came on suddenly while she was carrying a heavy umbrella. Her arm gave out and became practically useless. There was no pain or any other symptom except that she remembers having had a swollen face at the time. The weakness in her arm gradually got better and in two months she thinks she was quite well. The arm gave her no more trouble until the beginning of her present attack. She used it for everything and does not think that it was any smaller than the other. About three years ago she began to notice that the right arm was weak and that it tired after any continued effort. This gradually increased and the muscles of the hand began to waste. There was no pain in the arm and the only sensory symptoms were that the hand felt numb and cold more often than the other. During this last winter the condition has gotten so much worse that she has been unable to use the hand in sewing for several months.

As you see, the patient is a remarkably strong, healthy looking girl. She has shown no signs of a neurotic temperament. All the cranial nerves act normally and, indeed, there is no abnormality other than the condition of the right arm. The muscles moving the shoulder-joint all act well and flexion of the elbow is strong, although perhaps a little weaker than on the left side. Extension of the elbow is quite weak. Below the elbow the muscles show very little power. In flexing the wrist, you will notice that the tendon of the flexor carpi radialis stands out prominently, and this muscle shows a fair amount of strength. When the wrist is extended, or, more properly, dorsally flexed, and I make effort to straighten it, you will see that the ulnar side gives way, showing that here, too, the muscles on the radial side are stronger. She can just flex her fingers, but with very little power. She can extend the thumb, index and little fingers, but here too the power is slight. The power of extension of the two middle fingers is still weaker. The intrinsic muscles of the hand are all extremely weak, most of them, indeed, entirely paralyzed. The right arm is, in general, smaller than the left. Above the elbow this is not so marked, the difference of circumference being a little more than one cm. Below the elbow it is from two to two and a half cm. smaller than the left. There is marked atrophy of the intrinsic muscles of the hand. There is some slight contracture in the fingers, showing the beginning of the claw-hand position. There are no marked trophic changes in the fingers. The nails are smooth, but are perhaps a little more curved laterally than those of the left side. No fibrillary tremors are to be seen.

Sensation, when tested with a light touch of the finger, shows no abnormality; if, however, it be tested with a horsehair, it is found that there is an area of disturbed sensation which occupies the ulnar border of the forearm, extending somewhat above the elbow and taking in the ulnar aspect of the hand. In this area the patient often does not appreciate the slight touch of a hair and does not feel a sharp point, as sharp. We were unable to determine any abnormality in her perception of heat or cold. She seems to appreciate equally well on the two sides.

The deep reflexes are interesting. There is an active biceps jerk, but practically no triceps reflex, whereas on the left side it is excellent.

Electrical examination shows very marked changes. There is practically no response when the nerves at the elbow are stimulated. The flexor carpi radialis is an exception to this. A strong faradic current applied directly to the muscles of the forearm causes very little result, and the intrinsic muscles of the hand cannot be made to respond. It is quite remarkable that in muscles which still show voluntary power there should be no faradic response. To the galvanic current there are various degrees of the reaction of degeneration.

Pressure in the plexus above the clavicle on the left side gives no particular discomfort, while on the right it causes a tingling, uncomfortable feeling which runs down the inner border of the arm to the fingers.

A solution of cocaine put into the eyes dilates the pupils equally.

The similarity in the condition of these two cases is, as you see, quite marked, and having them under treatment at

the same time, it is natural that we should look for a common cause. In this patient nothing can be discovered by palpation and Dr. Cushing tells me that the excellent X-ray pictures which have been taken in the hospital by Dr. Baetjer do not show the presence of an extra cervical rib. Although the similarity in the condition of the hands of the two patients is striking, in certain other respects the cases differ widely. In the first patient, the degenerative paralysis is limited to the intrinsic muscles of the hand; and the general weakness of the arm, with normal electrical reaction of the muscles, is, I believe, to be associated with her other hysterical manifestations. In the second case, the muscular defect is more widespread, involving, besides the intrinsic muscles of the hand, the muscles of the forearm, the radial muscles being less affected than the others. The triceps group is also very weak and the triceps reflex is lost. There is marked electrical change in all these muscles. The most striking difference, however, is the complete absence in the second case of any pain, which is such a prominent feature in the first. The objective sensory disturbance is also much more definite in the first than in the second case. The condition of the first patient is well explained by a lesion, which irritated and paralyzed the first thoracic nerve on its way to the brachial plexus, and, as Dr. Cushing has told you, the operation revealed such a condition. In the second case the muscles which are affected are principally represented in the first thoracic and eighth and seventh cervical spinal nerves. Those muscles which are less affected, the radial extensors and flexors of the wrist, are, together with the flexors of the elbow, represented somewhat higher in the plexus, and, to explain the condition, we must think of a lesion affecting these three spinal nerves, or the spinal cord at the level from which they arise. The absence of all spontaneous pain, which is such a prominent symptom in lesions of the spinal root, makes it hard to think of such a cause; and the disproportion between the objective sensory disturbance and the motor paralysis speaks against a destructive lesion of mixed nerves. In this connection the article by Farquhar Buzzard (Brain, Summer, 1902) is of interest. He reports six cases of paralysis of the arm, due to what he assumes to be some vascular disturbance in one or more of the roots forming the brachial plexus. The condition in one or two of his cases is quite similar to that seen in our second case. Buzzard has no pathological observations to support his view. If we assume a central trouble to explain our patient's condition, there are two possibilities which seem to me to be worthy of consideration; the first, the presence of syringomyelia, or an analogous condition; and the second, a progressive degeneration in the anterior horns, following an old acute trouble, which may have caused the sudden paralysis of the arm when the patient was a child. There are difficulties in the assumption of either of these views. I feel that at present an absolute diagnosis is not possible, and that we must wait for further developments.

Dr. Cushing.—Unusual cases are proverbially apt to appear in duplicate, and I may have been influenced by this tradition when I admitted this second patient into the hospital with a presumable diagnosis of a cervical rib. There was a distinct point of tenderness over the plexus on the right side, pressure on which, as in the former case, caused a sensation of numbness and tingling to extend downward along the ulnar border of the arm. The sensory and motor symptoms, although more extensive than those in the first patient, I nevertheless thought could have been occasioned by pressure against the lower part of the plexus, involving more than the single first thoracic trunk. The radiograph, however, has shown nothing more than an unusually well developed transverse process on each side of the seventh cervical vertebra, and no distinct indication of a rudimentary rib. It is, of course, not impossible that a fibrous band representing such a rudimentary rib and casting no shadow from the X-rays might be the cause of such a pressure palsy, for it is well known that in cases of cervical rib the symptoms occasioned thereby are by no means proportionate to the degree of development of the bony process. Thus a very small rudiment, as in our first case, may be provocative of severe symptoms for which the fibrous prolongation of the bony process under the plexus may be alone responsible. Luschka, moreover, in his description of these rudimentary ribs has classified them in three groups, in one of which the bony process does not extend laterally beyond the tip of the transverse processes of the seventh vertebra.

The careful examination which, under Dr. Thomas' direction, has been given this patient has shown that several other diagnostic possibilities are present, and in the absence of any subjective discomfort on the part of the patient this has seemed to render operative exploration inadvisable. The patient, furthermore, has improved under a general rest treatment with electrical exercises for the muscles.

Although an absolute diagnosis in this case must remain undetermined, the similarity in the clinical picture of the two patients before you cannot fail to be somewhat suggestive, and they have been presented together chiefly for the purpose of emphasizing the fact that pressure from a supernumerary cervical rib must always be borne in mind as a possible causal agent in palsies of this type. In two recent articles, which have dealt with the subject of radicular palsies, one by Duval and Guillain, from Raymond's Clinic, and the other by Buzzard, which Dr. Thomas has quoted, no mention was made of a cervical rib as an etiological factor in their production. One of two of Buzzard's cases are not at all dissimilar in their description to these patients before you.

From an anatomical standpoint, instances of cervical rib are not exceedingly uncommon, and indeed reports of this anomaly are to be found in very early medical literature.[1]

[1] Sir Thomas Browne in his Pseudodoxia Epidemica or Commentaries on Vulgar Errors (Second Edition, London, 1650, p. 392) speaks of the heated discussion over the biblical story, which arose from the description by Columbus of a female skeleton which possessed a supernumerary rib.

"That a Man hath one Rib lesse than a Woman, is a common conceit derived from the history of Genesis, wherein it stands delivered, that Eve was framed out of a Rib of Adam; whence 'tis concluded the sex of Man still wants that rib our Father lost in Eve. And this is not only passant with the many, but was urged against Columbus in an Anatomy

Mr. Brush has recently reported in the BULLETIN a study of three cases which were found among the material in our own Anatomical Department. When one considers, however, that but a small percentage of the individuals possessing this abnormality have any symptoms referable thereto, it can be seen that the clinical cases with symptomatic disturbance from this cause are in reality quite rare. The cases, furthermore, in which these symptoms have been sufficient to call for operative intervention and excision of the rib are still more uncommon. I know of no recent article in which a report of the collected cases has been made. In 1895 and 1896 several papers appeared on this subject and at that time there seem to have been only ten or twelve instances of the operation which had been mentioned in medical literature. Borchard in 1901 had cognizance of only sixteen cases.[2]

There may be great variation in the symptoms which are occasioned by the presence of such an anomalous rib. Oftentimes it may give no indication of its presence whatever and a chance examination only may have led to its detection. In case the rib is a well developed one, however, the abnormally high position of the subclavian artery and the unusual bony prominence which can be palpated beneath it will have attracted attention to its presence. In such cases there may be serious vascular complications. In some individuals, as in the patients before you, disturbances from pressure on the plexus may be present. These may be transient in their appearance and only be produced by fatigue or by certain postures which tend to augment the tension of the plexus. Symptoms may, on the other hand, be more or less persistent. In some cases the symptoms are simply those of slight paresthesia; in other cases, pain of a radiating character may be produced, but it ordinarily is absent; in others, motor palsy is most apparent and it may be even more advanced than in this second patient which Dr. Thomas has shown. Occasionally, symptoms may begin at an early age. As a rule, however, they are for one reason or another postponed until adult life. Certain occupations which necessitate the carrying of heavy weights may by putting the plexus on the stretch suddenly precipitate symptoms in patients in whom they were previously latent. Thus de Quervain, for example, has pointed out that the musket drill has produced paralytic symptoms in young recruits from this cause, the presence of a cervical rib having been previously unsuspected. It will be remembered by many here that a recent member of the Hospital Staff, who was particularized by the presence of a cervical rib, made a careful study of the selective sensory disturbances which were occasioned thereby in his own arm. The results of this investigation were reported in the first number of the Journal of Experimental Medicine. In this case a fully developed cervical rib had produced relatively slight symptoms and those mostly of a sensory nature. In marked contrast to this condition was the picture presented by the first patient this evening, in whom a very rudimentary bony process had been productive of symptoms severe enough to incapacitate her to a great extent on account of pain and also to lead to what seems to have been a destructive lesion of the motor neurones of this lower cord of the plexus.

of his at Pisa; where having prepared the sceleton of a Woman that chanced to have thirteen ribs on one side, there arose a party that cried him down, and even unto oathes affirmed, this was the rib wherein a woman exceeded. Were this true, it would autoptically silence that dispute out of which side Eve was framed; it would determine the opinion of Oleaster, that she was made out of the ribs of both sides; or such as from the expression of the Text maintain there was a pleurality required, and might indeed decry the parabolicall exposition of Origen, Cajetan, and such as fearing to concede a monstrosity, or mutilate the integrity of Adam; preventively conceive the creation of thirteen ribs."

[2] Berliner klin. Wochenschrift, 1901, Bd. 38, p. 1365.

The Use of the X-ray in Surgery. DR. CODMAN, of Boston.
See May Bulletin, 1903, page 120.

The Physics of Radiography. PROF. AMES.

February 16, 1903.

The meeting was called to order by Dr. Hurd, in the absence of the President.

Absorption of Granular Material from the Peritoneum. DR. MACCALLUM.
See May BULLETIN, 1903, page 105.

Traumatic Pericarditis, Endocarditis and Myocarditis. DR. PLEASANTS.
See May BULLETIN, 1903, page 124.

Giant Cell Sarcoma of the Bone. DR. BLOODGOOD.
See May BULLETIN, 1903, page 134.

March 2, 1903.

The meeting was called to order by the President, Dr. Williams.

A Case of Angioneurotic Œdema. DR. BLOODGOOD.
See May BULLETIN, 1903, page 138.

DISCUSSION.

DR. OSLER.—These cases seem scarcely to belong to the ordinary type of angioneurotic œdema in which the œdema is singularly transient. No doubt there are instances with marked hyperæmia, of which this seems to have been a striking illustration. Those troublesome and disfiguring cases of the angioneurotic œdemas of the eyelid, will no doubt now be treated surgically.

Had this patient any colic?

DR. BLOODGOOD.—Yes.

A Clinical Summary of Fifty Cases of Summer Diarrhea. DR. KNOX.

The mortality among young children is largely due to diarrheal diseases, a large part of which occur during the summer. The Thomas Wilson Sanitarium was built for the treatment of such cases, and every summer 300 to 400 cases of intestinal disorders receive treatment there. Dr. Booker's important work on the bacteriology of the diarrheas of chil-

dren was done there. The recent revival of interest in the subject has been due to Dr. Flexner's stimulus and co-operation.

Clinically, there are many classifications of summer diarrheas, all of them being more or less unsatisfactory. Two divisions, however, are useful to recognize—(1) gastro-intestinal catarrh, in which toxic symptoms predominate; (2) ileo-colitis or colitis, in which there is follicular ulceration.

In the first group there is malaise, food is refused, nausea and vomiting come on, there is fever of varying degrees; then the diarrhea begins, the stools being semi-fluid or fluid, containing more or less mucus, and sometimes tinged with blood. Microscopically, they contain epithelium, pus, and a few red-blood corpuscles. The fulminating type is called cholera infantum. In this the toxic symptoms are intense, there is great constitutional breakdown, with high fever, clammy extremities and serous stools, the patient passing into stupor, then becoming comatose, and dying before many hours have passed. There are cases in this group which become subacute or chronic, lasting for a considerable time. These are the so-called cases of intestinal indigestion, which have occasional exacerbations and gradual loss of weight.

Pathologically, the cases are characterized by absence of lesions, the intestines are pale and contain catarrhal exudate, which is seen microscopically to consist of red and white blood corpuscles and epithelial cells. Occasionally there is an adherent membrane, with spots of ecchymosis in the ileum or colon. Peyer's patches and the mesenteric glands are swollen.

In the second group the symptoms may be similar. The onset is often acute, the symptoms being those of an acute catarrhal inflammation as before, but there is soon destruction of tissue. Localizing symptoms are prominent, there is much colic and tenesmus, and wasting is marked. The stools soon suggest ulceration, blood being present in large amount, often mingled with pus. The cases may, however, become chronic, and are then very tedious. Complications may arise, such as hydrocephalus, or a peculiar subcutaneous hardness, due to loss of fluid from the tissues. About one-third of the cases belong in the first group, the remainder in the second.

A striking fact was that in thirty of the cases unboiled water had been used either for diluting the milk or for cleaning the feeding bottle, and as it is known that there are frequently millions of bacteria per cubic centimeter in unboiled water in the summer, it is easy to imagine that the original infection may have often come from the water. Soiled linen was doubtless one channel of infection. One case developed diarrhea while at the Sanitarium, although receiving pasteurized milk and boiled water between feedings. The infection was probably carried by flies.

Treatment.—In cases seen reasonably early, the bowels are emptied by a purge, milk is withheld as long as possible, stimulation is used as needed.

In conclusion, it may be said that (1) diarrhea in children due to the B. dysenteriæ cannot be differentiated from ordinary summer diarrhea. (2) The discovery of the cause is the first step towards providing a remedy. One method of prevention will certainly be the provision of a plentiful supply of pure milk for those who cannot get it themselves. (3) The agglutinative reaction must be the means of diagnosis for the clinician. It will be especially useful in cases with a slight onset. (4) Disinfection must be thoroughly practiced. (5) Early diagnosis by laboratory methods makes the treatment more easy.

The Bacillus of Dysentery, with Special Reference to its Etiological Relationship to the Summer Diarrhea of Children. DR. FLEXNER.

In 1898 Shiga reported his studies of Japanese dysentery in the *Centralblatt für Bakteriologie*. He had already published preliminary reports in Japan previously. In order to be sure that the organism which he described was etiologically concerned, Shiga used an agglutinative test. All previous descriptions had failed to mention control tests. The bacillus described by Ogata, for example, was merely peculiar in its characteristic. Still another bacillus was found to be merely pathogenic to animals. These qualities, however, could not serve as criteria, and Shiga's use of an agglutinative reaction was the first definite work in that direction. He fails to receive due credit from German writers. Not all dysenteries are due to the Shiga bacillus. The amebic type, for example, is apparently an independent infection, although in some cases of amebic dysentery there may be a previous or a subsequent bacillary infection. Epidemics of dysentery are, however, doubtless all due to the Shiga bacillus. Local outbreaks and many of the sporadic cases are likewise due to the same organism. In spite of Kruse's suggestion that institutional outbreaks of dysentery are more likely to be due to pseudo-dysenteric organism than to the Shiga bacillus, Vedder and Duval found only the Shiga bacillus concerned in outbreaks of institutional dysentery in New Haven, Conn., and Lancaster, Pa. In the United States, therefore, it is reasonable to infer that the institutional cases, as well as many of the sporadic cases, are due to this organism.

The organism is like the B. typhosus, and may be easily confounded with it. Chemically, their action is very similar, but B. dysenteriæ is not motile, and its agglutinative reaction serves to differentiate it. The question of its motility is an interesting one. Shiga's first report and my own early observations agreed that the organism was motile. In 1901 Kruse reported a small epidemic, ignoring the work done by Shiga and the Johns Hopkins Commission, and said that B. dysenteriæ was non-motile. Vedder and Duval failed to find motility, but succeeded in staining flagella by Van Ermengem's method. Later, at the Thomas Wilson Sanitarium, Bassett and Duval proved that the organism was motile, but only under certain conditions. If it be passed through guinea-pigs, transplanted to bouillon, then to second bouillon, the transfers being rapidly made, a rapid motility can be made out which quickly disappears. Similar difficulty was experienced in determining the motility of B. coli during the earlier

studies. Perhaps in nature the Shiga bacillus is motile, but in cultures this is quickly lost. The presence of flagella proves probable motility. In some epidemics B. dysenteriæ has not been isolated, but this failure can be readily explained. The method of isolation is described fully in the Journal of Experimental Medicine, 1901. The most important recent contribution on the subject is the study made at the Thomas Wilson Sanitarium in the Summer of 1902, the Shiga bacillus being found there in the stools of forty-three cases. The number of bacilli present varied with the nature of the stools, most organisms being found in the bloody portions and the next largest number in the mucous portions, comparatively few being present in the solid portions. The etiological relationship of the organism is proved by the agglutinative reaction, which may, however, be delayed or fail altogether to appear. It is most useful in cases where it appears early. If it appears late, it may not be possible to use the antidysenteric serum with success. It is safe, however, to assume that as many as forty-three out of fifty cases of summer diarrhea are due to the Shiga bacillus. There is probably some slight difference in organisms isolated in various cases. The agglutinative reactions are somewhat irregular, as also are the chemical reactions in sugar media. For instance, all form acid, but no gas, in glucose media, while only some of the cultures form acid in mannite. This suggests that we are probably dealing with a group of organisms rather than with a single species.

The results with protective serum will be followed with interest. In 300 cases recently studied Shiga tried this and found it of definite use. Kruse published a paper more recently and ignored Shiga's work. Horses are being at present immunized in Philadelphia against the B. dysenteriæ, the cultures which are used being of such virulence that 1 mg. will kill a guinea-pig weighing 300 grammes. The serum thus prepared will definitely protect guinea-piggs, and it will be tried on a large scale in human cases next summer. By immunizing animals with various strains of the organism it can be determined whether there is any cross-protection. There doubtless is such protection, but a large amount of serum is required.

To summarize: (1) The acute dysentery of adults and the summer diarrhea of children are due to the same cause, *i. e.*, the B. dysenteriae of Shiga, the organisms having definite group characteristics; (2) Immunization against the organism is possible and the outlook for a protective serum is good.

DISCUSSION.

DR. WELCH.—We are all indebted to Dr. Flexner for the extremely interesting and clear account which he has given of the investigations of Shiga's bacillus and its relations to dysentery and infantile diarrhœa. It cannot be doubted that these investigations are of great value, and have already shed much light upon the etiology of an important group of diseases. As Dr. Flexner has pointed out, there remain a number of problems needing further study. Further information is needed concerning the prevalence and distribution of Shiga's bacillus and allied bacteria not only in diarrhœal diseases of infants and adults, but also in other diseases and in healthy persons and in external nature. Just at present one of the most urgent problems is the precise determination of the cultural and other characters which belong to Shiga's bacillus or to the Shiga group of bacilli. Recent studies, especially those of Martini and Lentz and of Hiss and Russell, have led to the recognition of a group of bacteria resembling closely the original bacillus of Shiga, but differing from it by certain cultural and biological characters considered by these investigators sufficient to separate the former bacteria from the genuine bacillus dysenteriæ. It is, therefore, contended that without more refined methods than those commonly employed in the earlier investigations, various species of bacteria are likely to be confounded with the true bacillus of dysentery and have in fact thus been confounded. There seems to me much in favor of Dr. Flexner's position that we must widen the boundaries assigned to the bacillus of dysentery and recognize here, as we do in the case of the colon bacillus, a group of bacteria closely allied in morphological, cultural and pathogenic properties, although not identical with each other in all respects. Thus we recognize colon bacteria which ferment saccharose and other colon bacteria which do not ferment saccharose. So it is permissible to take the position that possession of the capacity to ferment mannite, for example, does not in itself necessitate the removal of an organism from the group of the dysenteric bacilli. Then very interesting and sometimes perplexing agglutinative properties are possessed by members of this group, which would seem in general to be characterized by curious variations and differences in their receptor apparatus, well deserving careful analytical study. It is evident that considerably more work is needed before these, and kindred questions are answered to the satisfaction of all workers in this new and important field.

It is of interest, although not surprising, that Shiga's bacillus is found to be the specific agent of infection in various forms of dysentery, which had formerly been separated from each other on anatomical and clinical grounds. We are quite familiar with the circumstances that many other kinds of bacteria, such as, the diphtheria bacillus, and the pyogenic streptococci and staphylococci, may each produce affections with varying anatomical and clinical characters. While this experience is not altogether welcome to the clinician and the pathologist, it furnishes no valid argument against the recognition of the bacillus in question as the specific cause of these various affections.

Whether all forms of dysentery can be brought under one or the other of the two great classes—amœbic dysentery and bacillary dysentery—is a question. At present this does not seem to be the case. It is rather curious that, so far as I am aware, the Shiga bacillus has not hitherto been isolated from any case of dysentery in England, although it has been sought

for. Still we should bear in mind that much experience and skill are needed before we can say that a negative result in this matter is conclusive, as the isolation and recognition of Shiga's bacillus require special training.

Case of Myelogenous Leukemia with Several Unusual Features. DR. SIMON.

See The American Journal of Medical Sciences, Vol. 125, June 1903, p. 984.

March 16, 1903.

Dr. Williams in the chair.

Two Cases of Cirrhosis of the Liver in Children. DR. OSLER.

DR. OSLER.—This first child, aged seven, was admitted February 7, with the history of probable lues in the mother, who had had numerous miscarriages. The child's father disappeared some years ago. This child has had measles and whooping cough and a year ago was brought to the dispensary with enlarged glands of the neck; has had occasional attacks of bronchitis but no signs of tuberculosis. About the first of February, the mother noticed that the abdomen was enlarged and hard. There is nothing in the face, the teeth or the conformation of the head to suggest lues. On examining the abdomen it is at once seen that there is considerable enlargement in the upper region with a definite ridge midway between the navel and the ensiform cartilage which corresponds with the edge of the enlarged liver. The superficial veins are moderately distended. On palpation, the entire upper section of the abdomen is found to be filled with a hard, firm mass, everywhere smooth on the surface and nowhere painful. Just below the navel, in the nipple line, can be felt a hard, firm edge. As you get the fingers under the left lobe of the liver, you feel that it is hard, and thickened. The edge of the enlarged spleen can also be felt. There is no glandular enlargement elsewhere. The vertical area of liver dullness extends fully ten inches. There is no sign of any ascites or swelling of the feet.

The conditions with which enlarged liver in childhood is associated are tolerably numerous. Of course in very young children it is common in any condition of malnutrition; you see it particularly in rickets where it is almost the rule. Another very common cause of enlargement early in life is syphilis and this is seen both in congenital cases and also within the first year of life and it may be seen later but of course the majority of cases of infants with hereditary syphilis of the liver die within the first year. In this country and in Europe an enlargement of the liver due to cirrhosis is rare; you pass a year perhaps without seeing a single case. But in tropical countries it is exceedingly common and perhaps one of the most interesting contributions to the subject has been made by the Anglo-Indian physicians, who has shown that cirrhosis of the liver is very common. One physician, has reported, I think, nearly double the number of cases of cirrhosis of the liver in children that have been reported in the literature before. He attributes it to the absorption of the imperfect products of digestion. In a large proportion of cases in children the organ is enlarged but there is no ascites until late in the disease and there is very rarely jaundice.

Case. 2. This lad, aged 13, was admitted February 27, complaining of a swollen abdomen. There is nothing in the family history and nothing very special in the personal history. He has had measles but no other severe illness. Within the past year he has occasionally taken a few glasses of beer. For years his father thinks there has been perhaps a slight failing in health and for two or three months past he has been dull mentally but the enlargement of the abdomen came on somewhat suddenly and only a few days before admission. Since his entrance the abdomen has progressively enlarged and as you see is very tense and shows large distended veins. There is bile in the stools but none in the urine. The abdomen is uniformly enlarged and a point of interest is that in the veins the current is upward. Before the abdomen became so much enlarged the spleen was palpable.

Of course one was suspicious at first of a local cause of the ascites and the common one at this time of life is tuberculosis. That has been the suspicion in this case until recently. He has had a slight fever so that we could not give him tuberculin. Recently we have rather leaned to the possibilities of an atrophic cirrhosis with ascites; the distension of the veins is very suggestive.

In any case the condition is such now that it would be better to thoroughly drain the peritoneum and that will be done at an early date. He is very uncomfortable and his respirations are embarrassed so that he has reached the stage when tapping has become a necessity. It is by no means easy to make the diagnosis between fluid due to cirrhosis and fluid due to local disease of the peritoneum and this is complicated by the fact that in a certain number of cases of cirrhosis of the liver there is a terminal tuberculosis of the peritoneum and twice it has occurred to me to find both diagnoses true. The abdomen was opened and drained a few days later. The liver was atrophic and cirrhotic.

Exhibition of Cases. DR. REIK.

DR. REIK.—I have the opportunity to show you tonight rather an unusual collection of abnormally developed eyes. It is well known, of course, that congenital defects are often associated with heredity and this is frequently noticed in malformations of the eye but one rarely witnesses a more marked instance of hereditary transmission than is seen here. This woman, in every other respect of normal development and perfect health, has a complete coloboma of the iris of the right eye, *directed upwards,* and an incomplete coloboma of the left iris directed *upwards and outwards.* Her right eye is quite amblyopic, vision = 18-200 while the left eye, with + 1.Dc ax. 90°, has vision = 20-30. She has three children, a girl 18 years of age, a son aged 16 and a younger daughter, in whom we are not interested at present because she is only a half sister to the other children and shows no ocular defects. The two older children are present and have defects

which I will explain directly. Let me say first that while coloboma of the iris is not uncommon it very rarely appears in this part of the iris. The usual direction is downward and inward.

The older girl came to me in July, 1901, when examination showed, in both eyes, complete aniridia, posterior polar cataracts, and buphthalmos with a cupping of the disks of about 2 mm. Her vision was only ability to count fingers at three feet, in the right eye, and 2-200 in the left. The most careful inspection with the ophthalmoscope and by oblique illumination failed to reveal the slightest trace of iris in either eye. The patient was almost helpless and there was no hope of improvement in her condition unless it could be secured by surgical means. In addition to the defects mentioned she had a high grade of myopia, estimated by the ophthalmoscope at 12 dioptres, but glasses did not improve her vision. The right eye was selected for operation first and after repeated needlings complete absorption of the lens substance was secured. Discission of the capsule was then performed and the operation was immediately followed by a severe and prolonged attack of glaucoma, the explanation of which is not very clear since there could have been no blocking of the anterior angle in an eye which had neither iris nor lens. The left eye was operated upon somewhat differently after needling the lens to produce a traumatic cataract its extraction was accomplished with the aid of irrigation and a very satisfactory result secured at once and without any complications. With her correcting glasses she now has vision in the right eye of 12-200 and in the left eye of 25-100.

The brother presents at this time much the same condition as I have described existing in the sisters eyes when I first saw her, that is, there is complete absence of the iris, posterior polar cataracts, nystagmus and a divergent strabismus. His lenses are not so cloudy, however, and his vision is sufficiently good to enable him to go along without an operation. I have described these cases in greater detail in the Journal of Eye, Ear and Throat Diseases for January, 1903.

A Review of Ehrlich's Receptor Theory of Immunity. DR. MARSHALL.

General Infection with Bacillus Typhosus without Intestinal Lesions. DR. HARRIS.

To appear later.

Exhibition of Specimens from a Case of Reynauds Disease. DR. VAN WART.

To appear later.

April 6, 1903.

The meeting was called to order, in the absence of the President, by Dr. Hurd.

Exhibition of Surgical Cases. DR. HALSTED.

Demonstration of a New Hemo-alkalimeter. DR. DARE, of Philadelphia.

See BULLETIN for July, 1903, page 175.

Solitary Tubercle of the Stomach. DR. VAN WART.

See BULLETIN for September, page 235.

May 18, 1903.

The meeting was called to order by Dr. Hurd.

Exhibition of Medical Cases. DR. MCCRAE.

DR. MCCRAE.—This patient is a male, aged fifty-six, who comes complaining of pain in the right side and right leg. The family history is negative. He has been a healthy man; is not a heavy alcoholic; no history has been obtained of lues. His present trouble began two years ago with pain in the right side and back; it was sharp and stabbing in character. Ever since then he has had pain more or less constantly. The pain, comes on especially at night; he has to get out of bed and move around to relieve it; of late it has been getting worse. Any ordinary movements increase the pain; he has difficulty in sitting down and getting up. As the man comes up I should like you to watch his gait especially. I think you will all notice that he is favoring his right leg; that is he does not lift it as far from the floor as he does the left and comes down much more gradually on it. In the ordinary examination of the patient there is very little to be made out. He is fairly well nourished. Examination of the extremities is practically negative. The reflexes are, if anything, somewhat diminished. There is no special wasting and as far as the ordinary examination goes the results are negative. When one examines the condition of the spine he finds an explanation for the symptoms. The ordinary examination of the spine shows nothing remarkable. There is a certain amount of bowing forward of the vertebræ, which occurs so commonly with advancing years, and particularly with emphysema, which this man has. In the lower part of the back, where he complains of pain, there is little to be made out. The lumbar curve is normal, and there is only one thing that would attract attention; that is, the muscles of the back are exceedingly rigid; more particularly on the left side. When one tests the mobility of the spinal joints it is at once evident that the mobility is almost negative. He shows that probably in the best way when trying to pick something up from the floor. You see the curious going down on one side. When he stoops forward I think you will notice that there is practically no movement in this part of the spine. The conclusion then is that he has some involvement of the lower spinal vertebræ. The X-ray plate shows very definite deposits of bone between the vertebræ.

The patient does not react to tuberculin and the diagnosis of local arthritis of the spine seems justified. If this man has, as we suppose, local arthritis of the lower portion of the spine, by putting it at rest in a plaster jacket for two or three days his symptoms should be markedly relieved. The diagnosis we make here is of arthritis deformans, and especially of the osteoarthritic type. The lesson we have to learn from such patients is that the back should be very carefully examined. As to the therapy—the great essential in these cases is absolute rest, because apparently the more the joint is disturbed the more irritation and proliferation

of bone there is. It is certain that rest cannot be obtained with the patient in bed. It is very difficult to give them rest in bed and is very much better done with a felt-fitting plaster jacket, which can be left on for two or three weeks and later some light form of apparatus can be substituted, as a leather jacket.

DR. HURD.—Are there any other joints involved?

DR. MCCRAE.—In this patient there are not. In the majority of these cases the other joints are not concerned. We have at present one other patient in the clinic who has quite extensive involvement of the other joints with general spondylitis, viz., the elbows, knees and ankles. Of course, the question as to the involvement of the other joints is an interesting one in reference to two other distinct diseases, the osteoarthritic group and the periarticular, involving the large joints of the extremities. We have had a number of cases showing the co-existence of the two types in one patient, both types belonging to the same disease. This man shows no involvement of any joints outside of the spinal ones.

One other point in reference to diagnosis. These cases are sometimes taken for hip joint disease. On examination of this patient the hip joints are apparently free and there is no limitation of motion. The hip symptoms seem to be referred to the nerve pressure.

The Plague in India. DR. B. ROSALIE SLAUGHTER, of Washington, D. C.

See page 307.

Conservative Perineal Prostatectomy Demonstration of New Instruments and Technique. DR. YOUNG.

To appear later.

Monday, June 1, 1903.

The meeting was called to order by Dr. Hurd, the President being absent.

A Case of Peptic Ulcer, in the Jejunum of a Dog following Gastroenterostomy. DR. WATTS.

See BULLETIN for July, 1903, page 191.

A Simple Electric Female Cystoscope. Demonstration. DR. CULLEN.

See BULLETIN for June, 1903, page 166.

Dentigerous Cyst and Adamantine Epithelioma of the Jaw, Lantern Slide Demonstration. DR. BLOODGOOD.

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